# TECHNICAL EDUCATION

BEING A GUIDE TO CAREERS IN THE PUBLIC SERVICES, COMMERCE AND INDUSTRY AND AN INTRODUCTION TO

## HEALTH, WEALTH AND HAPPINESS

BY

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WITH A FOREWORD

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# PREFACE

This book presents together the articles on Technical Education generally and on Chemical and Pharmaceutical Education particularly, which were mostly published in the "Statesman", the "Englishman" and "Forward" newspapers of Calcutta, also in the "Indian and Eastern Druggist", London, in the course of last three or four years and combines therewith the latest information, as far as possible, in respect of All-India superior services, provincial services, commerce, and industry, in order to render the publication a useful handbook for all classes of people both at Home and in India, who look up for Indian careers for themselves and their children either as government officials or in business and who wish to know what openings there may be for them if education is rightly directed. The task involved is a great one if it is designed to make the publication a comprehensive book of reference in regard to the subjects mentioned. On the other hand the scope of the book is a limited one in so far as it suffices to explain what education really means, how it may be rendered practical without losing its cultural side and how the regrettable waste of energy and resources on ill-conceived education may be avoided. The writer will feel amply rewarded if the book fulfils what is expected of it and, if so, it is hoped the book will be read and re-read by a large number of people who desire information as to what they should do in life according to their talents, circumstances and opportunities and how they are to shape their careers in order to make them and their country healthy, wealthy and happy.

The author desires to express his most grateful thanks to the government of India in the Home Department, to provincial governments and heads of departments who have kindly furnished the information incorporated in the book as regards the public services. It would not probably have been possible to publish this volume had Sir Willoughby Carey, Kt, not sincerely encouraged its publication and evinced his practical interest therein by contributing a foreword and the author begs to express his deepest thanks to him. He has also received valuable assistance form the Editors of several newspapers and journals, from the Associated Press of India and from several of his friends, Indian, European and Anglo-Indian, and takes this opportunity of thankfully appreciating their services.

Particular acknowledgments are due to Mr. John Lees, 47, Monton Street, Manchester, for his valuable advice, also to Mr. I. C. Bose, Dr. H. W. B. Moreno, M. L. C., and Rai Bahadur P. N. Mukerjee, I. S. O. for their helpful suggestions and kind assistance during the passage of the book through the press.

J. C. GHOSH.

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Calcutta,
*June 4, 1925.*

# FOREWORD

The attached article by Mr. J. C. Ghosh, B.Sc., appears to me a very excellent effort to clear up much confusion of thought which still exists as to the meaning of Technical Education in Bengal and its uses in assisting to reduce unemployment among the educated middle class young men of the Province. The distinction which he draws between the artisan training and that for the more educated type who should be destined to be in charge of the artisans in whatever industry or profession is intended, is one which cannot be made too clear. It entails from an early stage a distinct difference in training even though it is undoubtedly good for the more educated man to have an initial experience of the actual artisan work. If he is to have a future however as fereman, master, sub-manager, or manager of a large works or proprietor and manager of his own smaller workshop he must needs understand the technicalities of the industry as well as its practical side. At the same time he needs to be practical as well and that is why a practical apprenticeship is necessary for the educated man taking up a trade or industry, either before or after his theoretical teaching and examinations.

Industrialism in many directions has undoubtedly come to stay and grow in India and for this reason I would recommend very simple and easy books on technical subjects dealing with the industries indigenous or possible to the country being produced in the vernacular for use among the very young in primary and secondary schools, in order to

accustom and train their minds at an early age to thought on these lines, and to something outside of the daily routine of village or home life. The intelligence ripens early and it should be possible to discover when a boy has a trend in any particular direction at an age when initial teaching would be inexpensive, and in the case of a boy in a family who can give him an education, get him used to the idea of trades or professions other than literary.

Schools and Colleges should be divided as in other countries so as to provide a purely "modern" side in which from say 10 to 12 years of age a boy gains knowledge in these "technical and practical" or "modern" subjects, as contrasted with training in subjects for the literary or professional walks of life. That there are difficulties in connection with this is recognised, in that it means more expense and an additional class of qualified teachers, but Education Ministers of the immediate future might well give it their attentive study.

Thereafter additional scholarships, for training abroad in suitable subjects, of selected men to return as teachers should be a further consideration.

The main object of all this technical education, it should always be remembered, is to try and provide permanent and profitable employment both for the educated middle-class, the artisan class outside of the village craftsman and the agriculturist, and the Anglo-Indian.

Calcutta,
*3rd November, 1924.*

W. L. CAREY.

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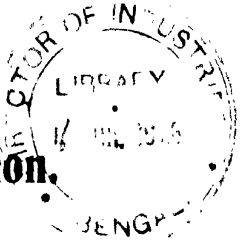
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# Technical Education.

## CHAPTER I.

### Evolution of Technical Education in India.

Origin of technical training under the old Indian system of education.

Under the indigenous Indian system of education, the bulk of the people ranging from ordinary cultivators to trained craftsmen, both industrialist and professional, used to follow their hereditary vocations, receiving instruction as apprentices, generally paid in kind, under their own caste people, while literary education used to be pursued by Brahmins generally. As trades and industries were allowed to be controlled by non-Brahmins, forming the bulk referred to, they were necessarily wealthy and used to support the Brahmins who never sought employment but cultivated knowledge for its own sake. In such circumstances higher literary education was synonymous with Brahminic or non-mercenary culture while wealth-producing education of any kind was synonymous with technical training on caste lines. Cultural education to develop the highest manhood standing for loyalty to truth, charity and love, on the one hand, and loyalty to the Crown and to the country, on the other, was encouraged in various ways through social amenites and otherwise. This

Highest type of education as conceived in ancient India and as designed to avoid unemployment.

arrangement hardly left room for unemployment, disappointment and discontent. Since, however, employment and education came to be co-related, education has been rightly or wrongly identified with the literary side and the people have lost sight of the dignity and economic value of manual labour and of technical education which is mostly manual, with the result that there has been a general run for a predominatingly literary education to the threatened or entire break-down of several occupations which conduce to social welfare and to the well-being of a nation. It appears, therefore, necessary, as often happens in regard to scientific truths, to re-discover and to re-establish what was once an established fact in the domain of the social and economic life of India. It is accordingly proposed to trace in this article how the idea was revived, or more correctly, how technical education in its modern sense was conceived and how it may be possible to re-introduce it into our educational curricula under the present circumstances, in order to confer lasting benefit upon all communities at large. As such the subject may be considered under the following heads :—

**Dignity and economic value of labour.**

**Need for re-establishing the principle in India.**

## I. Genesis.

**First Memorandum on Technical Education in India.**

In 1886, Mr. A. P. (afterwards Lord) Mac Donnell, as Home Secretary to the Government of India, first wrote a memorandum on Technical

First Memorandum on Technical Education in India (contd.)

Education in India, the prevailing system of literary education having been found inadequate to meet the entire educational needs of the country. Although the Sibpur Engineering College was started in 1880, there was always some vagueness till lately as to what was actually conveyed by Technical Education and any educational institution which went outside ordinary literary curriculum, such as survey or industrial schools or the Government School of Art, were regarded merely as outgrowths with no preconceived plan or object.

Government of India Resolution of 1888.

In 1888, so far as Bengal was concerned, the first active step was taken towards the inception of Technical Education on considered lines. This action was due to the Government of India Resolution of that year, which recommended *inter alia* the institution of technical schools at places where industries were centralised and in large towns where there would be a demand for such superior skill. The Resolution further resulted in the enlargement of the scope of the Sibpur Engineering College and of the Calcutta School of Art.

Industrial Survey of Bengal, 1890.

In 1890 a regular industrial survey of Bengal was undertaken by Mr. Collin, I. C. S., who in his report emphasised that each locality should adopt a system of Technical Education specially suited to its needs and that it was useless to imitate European systems unless modified to suit

Industrial Survey of Bengal, 1890 (contd)

Indian conditions. The broad outlines of his proposals were :—

(1) Institution of a mining school.
(2) Training of mechanical engineers in workshops of State Railways.
(3) Provision of special training for apprentices and intelligent workmen.
(4) Introduction of improved industrial schools.
(5) Appointment of an Inspector to supervise industrial education.
(6) Private firms, Municipalities and District Boards to open Technical Schools.

Mr. Collin's report and its results.

Mr. Collin's report which was treated as confidential till 1906, was considered by Sir Charles Elliott's Government with the result that it was decided to develop only the Sibpur Engineering College and the Calcutta School of Art, to encourage drawing in all schools and to impart an impetus in a few other directions, notably in respect of mining assistants, apprenticeship at Kanchrapara workshop and a Weaving School. As nothing was publicly known, a state of inaction apparantly intervened since 1890 owing to a lack of definite policy and of clear understanding as to what was actually required. The position led to such an *impasse* that in 1897 it was remarked in Mr. J. S. Cotton's report that no appearance of a system of Technical Education was visible anywhere in India. As a

result, however, of Mr. Hill's report, definite action was taken in 1901 by creating what was then known as the bifurcation of studies in district secondary schools, which allowed a student to elect two years before matriculation whether he would take up courses qualifying for admission to the Sibpur Engineering College for eventual training as Sub-overseer or continue his studies for the University Entrance Examination. But the prospect of being a sub-overseer only, coupled with the thought that it involved a large amount of manual labour ordinarily associated with the life of a workman, did not appeal to the youths of the middle class, and the so-called bifurcation or practically all endeavours made up to the end of 1902 with subjects of instruction consisting almost entirely of carpentry or smithy or both, which in most instances were little better than those of bazaar shops, naturally resulted in failure.

Mr. Hill's report and the action taken thereon.

While the fate of Technical Education in Bengal stood as above owing chiefly to two reasons, namely, (1) the natural apathy and the disinclination of the middle classes for manual labour, and (2) the misconception and the misapplication which unfortunately attended the subject, three main facts were discerned which apparently accounted for the failure. The first is that till 1901 there was no serious effort to explain what Technical Education really meant, as will be seen from the following summary of

Reasons for the failure of Technical Education till 1902.

## II. The Meaning of Technical Education.

**Failure of Technical Education. First reason considered in detail.**

Technical Education as interpreted by reputed authorities :—

| Authorities. | Interpretations. |
|---|---|
| Sir Phillip Magnus on the occasion of opening Finsbury Technical College in 1883. | Technical Education is that education, training or instruction which has a direct reference to the career of the person who receives it. This definition is, however, restricted in application as it applies to the training of an engineer or a chemist rather than to that of a surgeon or a lawyer. |
| English definition as generally understood in or about 1897. | Technical Education is any course of study prescribed by the Science and the Art Department. |
| German definition. | Technical Education is the study of the principles underlying every kind of human craftsmanship. |
| Lord Curzon, 1901. | Technical Education is that practical instruc- |

| Authorities. | Interpretations. | |
|---|---|---|
| | tion which would qualify a person for the practice of some handicraft, industry or profession. | Failure of Technical Education. First reason considered in detail (contd.) |
| Simla Educational Conference, 1901. | Technical Education is originally (a) the study of the scientific methods and principles underlying the practice of any handicraft, industry or profession, and secondly (b) the application of these methods and principles to the practice of the handicraft, industry or profession. | |
| Mr. Cumming's Report, 1908. | Technical Education is that special training for imparting skill, through the knowledge of principles, in any of the careers mentioned above. It means the instruction necessary for the foreman or the manager, the employer or the director. | |
| American view... | Technical Education is imparting to the work- | |

Authorities. Iterpretations.

Failure of Technical Education. First reason considered in in detail (contd.).

man an understanding of the scientific principles involved in his work.

The Simla Educational Conference of 1901 rightly drew a distinction between "Technical" and "Industrial" education, confining the latter to practical instruction and to the imparting of skill from practice in some handicraft. As such "Industrial Education" is a branch of Technical Education and is spoken of in some countries, particalarly in America, as Trade Education or Workshop Instruction and is intended for the artisan class only, who are either incapable of understanding the underlying scientific principles or whose social position and requirements preclude them from devoting the time and expense involved in the necessary theoretical study. This explanation settles the first main feature.

### III.—General Considerations.

Failure of Technical Education. Second phase and its remedial measures.

The second feature is drawn from the following general considerations :—

Before devising any system of Technical Education it seems necessary to determine (1) what classes of pupils it is proposed to cater for and (2) what openings there are, or may be available for them. Indian conditions and sentiments differ greatly from those obtaining in other countries. People here are generally impulsive and are not

Failure of Technical Education. Second phase and its remedial measures (contd.).

so calculating and far-sighted as their matter-of-fact brethren are in the West. Further, Indians are more attracted by a certainty of remuneration attaching to appointments in any capacity than by prospects of business which are more or less speculative and hazardous, nor have they yet learnt to reduce business speculation to facts and figures from a broader outlook or from a scientific study of the subject. It is true that literary qualifications have thrown open an increasingly large number of administrative and other appointments, as also the learned professions, to the qualified. But there is a limit to these appointments and the professions, especially now, are over-crowded. If the struggle for existence is directed solely towards qualifying for appointments, it must inevitably result in unemployment, disappointments and communal animosities which all sensible people deplore and try to avoid, knowing full well that while all people should qualify, their goal should not be appointments only, but success in *independent* careers, whether in agriculture, industries, arts, crafts or trades. A serious mistake was made when Indian youths consciously or unconsciously persuaded themselves to believe that, by the attainment of literary qualifications, they carried chances of employment and a great mistake would be perpetrated if, by offering Technical or Technological, Industrial or Vocational Education, we gave it to be understood either directly or indirectly that

**Failure of Technical Education, Second phase and its remedial measures (contd.).**

qualified students "would find no difficulty in obtaining employment". Indeed we all look for prospects; nevertheless, it must be distinctly understood that we are to earn a living, a decent living no doubt, by independent professional and technical work and not by service in most instances. If this view is always kept in the forefront—a fact which has been criminally overlooked since the idea of technical education was revived—it matters little whether we make Technical Education suited to the requirements of the artisan or the educated middle classes, or both. In any case the education imparted has to be properly labelled as intended for the one or the other class, so that there may not arise any misunderstanding and any failure as in the past.

### IV.—Need for Efficient Labour and for a Definite Policy.

**Failure of Technical Education. Third phase and its remedial measures.**

The third main fact is need for efficient labour and for a definite policy. Sir Edward Buck, late Revenue Secretary to the Government of India, who made a general enquiry in 1901, framed a very interesting report, reviewing the whole subject of Technical Education as found in India and in Western countries, and the conclusions eventually arrived at were, briefly:—

(1) What is required is a special trade school for a particular industry in the locality where a trade is carried on.

Failure of Technical Education. Third phase and its remedial measures (contd.).

(2) Only those people should be taught who are likely to follow the trade.

(3) Instruction in trade or industrial schools should be dissociated from ordinary literary education.

(4) Apprenticeship in workshops should be relied on for training artisans in preference to a system of class instruction as in schools.

The above conclusions clearly urge the necessity for creating a class of skilled artisans only and for training them in workshops instead of in schools and colleges. These conclusions also practically re-affirm the principles fully recognised under the indigenous Indian System referred to in the opening paragraph. The view which is thus set forth is so strongly and widely held that it could hardly be ignored in any scheme of educational reforms. If so, it would be idle to think of providing for the educated middle classes who are never intended to be *artisans*. Authorities like Sir Alfred Croft and Sir Alexander Pedler, writing on Technical Education, advocated the improvement of the artisan by teaching him improved manual skill, also the use of machine tools, and by developing his intelligence. From the European employer's point of view which was expressed in December 1923 by Mr. (now Sir Willoughby) Carey at the meeting of the Associated

**Failure of Technical Education. Third phase and its remedial measures (contd.).**

Chambers of Commerce, trained labour or the improved artisan is the first desideratum for the extension and development of industries. Without adding to the number of existing technical and engineering institutions, the present number being considered by him enough to meet immediate needs, Sir Willoughby Carey would have the work done through active promotion and expansion of forms of primary education of a nature preparatory to technical education. The Ordnance Department factories at Ishapore are closely following this idea in their scheme of technical education and a brief outline thereof is given in the statement appended hereto. This preliminary training, Sir Willoughby thinks, will obviate a great waste of time which is now generally the case with pupils who enter technical schools or colleges without any prior teaching tending towards technical or manual work, or tending to assist them in selecting any special branch of work. Apart from the use of primary education towards this object, Sir Willoughby Carey suggested the adoption of certain steps in secondary schools with a view to (a) ascertaining which boys preferred a technical or manual occupation and (b) providing facilities for a small class to be formed under a special teacher with a knowledge of technical subjects. One of the great drawbacks of this arrangement is already referred to in connection with the bifurcation of studies in secondary

Failure of Technical Education. Third phase and its remedial measures (contd.).

schools. The difficulties experienced could readily be overcome if, as was perhaps the case, bazaar carpenters, blacksmiths and other workmen were not employed as technical teachers and if capable school boys in technical work were allowed to proceed with the highest possible technical tuition by gradual stages instead of being told at the outset that they were to qualify only as artisans or sub-overseers. It is very natural with parents belonging to the middle class to object to the association of their wards with technical teachers of questionable character (unfortunately such was the case with certain schools), and to discourage them from lowering their ambition at an early stage of their growth. The precaution appears to be provided for in the scheme which has been tried with success by H. E. H. the Nizam's Government. The curriculum there ranges from primary school teaching to higher technical tuition and examinations are held to discriminate among boys who are capable of advanced studies, those incapable of mental training being made to concentrate on individual crafts. Sir Willoughby Carey's idea may be carried out both in primary and secondary schools if arrangements similar to those at Hyderabad are adopted with the necessary safeguards. These alone will provide for the inclusion of middle class youths in a scheme of Technical Education not necessarily identified with the artisan class.

## V—Method of Instruction.

**Essentials of Technical Education. First principle.**

The next point for consideration is the method of instruction. The first and the foremost necessity as generally accepted is that the artisan class will have to be improved by all means in order to increase the productivity of our present labouring classes, if the decided step taken by India towards industrialism—to some extent, as pointed out in the Indian Industries Commission Report and by such authorities as Sir R. N. Mukerjee and Sir C. E. Low—is to be maintained to protect the country from economic dislocation caused by failures of the monsoon. So far as mechanical work of any description is concerned, the object will best be attained by combining primary education with workshop training as provided by Ordnance factories, government and railway workshops, which are now thrown open for industrial education. The labour in cotton and jute mills, mines and factories, railway and engineering workshops may be given such educational enlightenment through night schools and workmen's institutes as will enable them to understand the underlying scientific principles of their crafts as explained in Chapter V under "Science and Industry". It is a misleading notion, indeed, that scientific principles are only intelligible through the medium of a higher university education. It is the morbid book-learning, generally in vogue in educational institutions, which made this idea predominant. The great bulk of

labour which lives on agriculture, India being predominantly an agricultural country, must be taught scientific agriculture through primary education or even by practical demonstrations if the present state of illiteracy continues. Similar remarks apply *mutatis mutandis* to other classes of labour, such as tanners, dyers, bleachers, oil-pressers, and members of other kindred vocations, showing that there is ample room for higher and highest education under any denomination without recourse to literary education.

Essentials of Technical Education. First principle (contd.).

### VI.—Technical Education on Caste Lines.

The next principle to be remembered is that it is generally useless to teach a potter a carpenter's art and *vice versa*. Under "Education and Castes", Chapter II, also in the article on "Vocational Education", Chapter III, and under "Science and the Bread Problem", Chapter VI, it is insisted upon to base technical education generally on caste lines. This is the view expressed by Sir E. Buck, as already summarised, and Sir A. Pedler definitely said that industrial education should be on caste lines.

Essentials of Technical Education. Second principle.

### VII.—Aim of Higher Training.

The third noteworthy principle is that when we come to deal with intelligent artisans and with the youths of the educated middle classes in all communities who will be free to follow the highest possible technical tuition, as already insisted upon,

Essentials of Technical Education. Third principle.

Essentials of Technical Education. Third principle (contd.)

particularly in the application of science to manufactures, mining, agriculture and sanitation, a training which is now known as Technological Education, we must scrupulously preclude from the programme any guarantee or encouragement of employment and make all pupils definitely understand that the profession or craft elected should be followed as an *independent* career irrespective of all chances of employment which may or may not be available. Unless this principle is steadily borne in mind, the whole outlook turns to be the gloomiest possible, as revealed in the summary of replies appended to the recent Report of the Dacca Technical and Vocational Education Committee.

### VIII.—Training to be on Commercial Lines instead of by mere University Work.

Essentials of Higher Technical or Technological Education. Fourth and the last principle.

The fourth and the last principle is that the practical training for higher technological education, as in the case of artisan training, must be provided on commercial and profitable lines and not in University workshops and laboratories which may be very elaborate and expensive, and which aim at mathematical precision but lack in business methods. For industrial success one would not only endeavour to maintain a high standard of quality, but make his arrangements pay more and more by adopting simplicity, substitutes, straight cuts and other money, labour and time-saving methods which could hardly be thought of in an

Essentials of Higher Technical or Technological Education. Fourth and the last principle (contd.).

educational institution, guided no doubt by learned but generally unpractical and unbusiness-like men. Colonel Mc Neill, R. E., Secretary to the Government, P. W. D., writing in connection with Mr. Collin's report, 1890, strongly expressed this view, saying that, where real work has to be done, the training should be on a commercial or profitable basis and not in workshops established simply for educational purposes. As an illustration he compared the success of commercial concerns like railway workshops to the failure of an educational institution to turn out reputed mechanical engineers or efficient artisans. This sound advice, though given over 30 years ago, still holds good, and a great deal of public money and waste of expenditure will be saved if the advice is remembered when large educational schemes are contemplated. The country wants practical results and not learned reports emanating from the halls of massive buildings dedicated to higher education. Practical results mean a great deal which is not ordinarily implied by and associated with higher education, and which it is not possible for a University or any educational and colonisation scheme to provide unless business methods—methods dictated by a knowledge of the habits, temperament and traditions, as well as of market conditions of a country —prevail throughout. The people are crying for food and it is of no avail to produce scientific curios under such grandiloquent terms as "key Industries,"

including mathematical speculations with erudite discussions thereon. Produce saleable articles capable of standing competition; ignore all education which fails to satisfy this test; raise the yield of crops and improve their strains by scientific research; introduce sanitary measures, bringing diseases under control, wherever possible, and see that scientific knowledge is brought to the very door of the *ryot* by capable teachers satisfied with humble emoluments and surroundings from the fact of their quick and efficient education on a commercial basis in an unambitious and inexpensive atmosphere—an ideal which is impossible of realisation under a system of University training obtaining in this country; and this is an ideal which is only possible where the education imparted is based on practical lines, and on profitable undertakings.

**Final tests to apply to Technical and Technological Education.**

Only the broad principles are herein stated. Let those interested in the development of the country's wealth and in the ending of unemployment weigh each principle here outlined and put it to practice if pronounced to be sound. By this procedure only good can ensue, good to the individual, good to the community, good to the nation at large. The appended statement which is referred to in a preceding paragraph, p. 12, gives a brief outline of the training provided by the Ordnance Factories School at Ishapore. Acting as a feeder institution for these factories it illustrates how both the industrial and the educated

**Conclusion. Example of a complete Scheme of Technical Education (mechanical).**

classes may be included in a scheme of technical education and how, with discretion, it may serve all classes well without giving rise to unemployment.

Conclusion. Example of a complete Scheme of Technical Education (mechanical) (contd.).

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*Outline of the courses of instruction at the Ordnance Factories School at Ishapore.*

| A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|
| Infant School for boys below 9 years of age. | Primary School for boys from 8 to 12 years of age. | Technical School for boys between 12 to 15 years of age. | Artisan Evening Class for boys after primary education to attend evening classes to be trained as first class mechanics. | Continuation Evening Classes for such factory staff as clerks, supervisors, draughtsmen, etc. | Apprenticeship class for trade lads who have matriculated and who wish to qualify as Foremen (5 years course,) | Apprenticeship class for educated students who are desirous of a professional training in Mechanical Engineering and of eventually qualifying for executive appointments (5 years course) |

The above is a complete and an ideal scheme of technical instruction and industrial training on commercial lines in a branch of mechanical engineering only. It is, however, incumbent upon us to encourage other kinds of technical education, such as chemical, biological, bacteriological, geolo-

Conclusion. (contd.).

gical and otherwise. In this volume we confine ourselves chiefly to the chemical side and as funds become available, we must go ahead, thereby promoting a steady and an all-round evolution of technical education in India.

## CHAPTER II.

### The Meaning of Education.

#### Civilisation and Education.

Classical and modern definitions of "Education".

Whether in the East or in the West, there has been no civilisation worth the name in any country without a basis of education to stand on. Consequently it occurred to thinkers of almost all ages and of many countries to define what they meant by Education. It would no doubt be very interesting to get together all the classical and modern definitions of Education and to deduce therefrom whether the ideas on the subject have gradually developed or tended to deteriorate through materialistic and other influences. It is, however, beyond the scope of this volume to take up the point by going deep into the matter and to deal with it accordingly. Nevertheless, the subject has been introduced here only to show how the author's conclusions with regard to Technical Education are derivable from the meaning of Education as conceived by him. It is for the readers to judge whether and how far he is consistent or not.

### Ordinary Definition of Education.

Questions for consideration.

Commencing with the days of Plato and Socrates and coming down to Matthew Arnold, Herbert Spencer, and to modern educationists, we find Education to be variously defined. Leaving erudite discussion alone we may take our stand on how the question is likely to be looked at by the man in the street. A school boy, and perhaps often his educated guardian, would ordinarily look up a dictionary and say that Education means the development of the various physical, intellectual, æsthetic and moral faculties. All human beings are endowed more or less with these faculties and questions arise :—

(1) Whether equal facilities are to be provided for all.

(2) Whether education should be compulsory or optional, subjective or objective.

(3) Whether all the faculties require to be devoloped in every case.

(4) Whether the desired development is for personal gratification and necessities, or for the community at large.

### Education and Instruction.

Purpose of Education.

There are conflicting replies to the questions raised and a good deal thereof is due to confusion of "Education" with "Instruction", as will presently be shown here. This confusion apart, unanimity is hardly possible until we arrive at a

**Purpose of Education (contd.).**

decision as to the purpose for which Education is desired. Thinkers of different schools do not agree and if, besides, there is a clash of interests, divergences multiply. But considering man essentially as a social being, fond of living in groups leading to the characteristics of a tribe, race or nation under patriarchal or some other form of government, one naturally comes to the conclusion that there is something beyond ephemeral personal wants. It does not take us long to be convinced that this something is the commonweal either of a family, community or country, and ultimately of an Empire, of the Commonwealth of Nations, or the Commonwealth of Humanity.

**Education as viewed from a higher standpoint.**

**Education and personal needs.**

It appears that the wider the horizon of outlook, the higher is the plane from which Education may be viewed. Taking the individual at the centre and representing larger interests by gradually expanding circles as we rise step by step from family to clan, from tribe to nation, we may first consider Education from the point of view of a family represented by the narrowest of these concentric circles. Even from this restricted view Education, though ordinarily for earning a living, for understanding one's rights and obligations and for asserting them, is not for the satisfaction of personal inclinations alone irrespective of other considerations, but for meeting the wants of a family in the

best possible way just as nutrition is to feed, repair and develop every cell and ultimately the whole compact organism. Personal needs, if any, will have to be subordinated to a higher need if the essential nature of man as a social being is to be complied with. A further scrutiny merges the personal element in the higher ideal of a nation and in the still higher one of humanity. For practical purposes it is enough to proceed as far as the outlook of a nation carries us.

Education and personal needs (contd.).

### Definition of Education from a National and a Communal point of view.

From a general point of view Education may be defined as the befitting of a man or a woman justly, skilfully and magnanimously to fulfil *public* duties whether of peace or of war. From the communal point of view Education is the cultivation of certain special activities and experiences which the community selects and arranges for its younger members in their best interests in order to befit them for social or communal life in which each member of the community has his or her share. Education looked at from either point of view must run on certain approved lines conducive to communal or national well-being and these approved lines have been found to be *generally* those of *national guilds* which, in the course of their stabilisation and evolution, are eventually converted into hereditary classes (*known in India*

Education defined.

Education defined (contd.).

*as castes*), rendering every member thereof a *partner instead of a servant* in the affairs of the community. This is a vital point in the conception of democracy and cannot be overlooked. If this principle is once accepted, as it was unique in India under the indigenous system of education from the highest intellectual and spiritual to the roughest manual kind, it will automatically decide on what lines the education of a community or a nation should be moulded to meet varied requirements and exigencies of circumstances. To keep that entire organisation in order a central authority becomes necessary.

### Misconception of Education. Contrast with Instruction.

Principle of the division of labour and its utility.

The requirements referred to above are numerous and no nation or community can afford to remain blind to the necessityfor maintaining them fully satisfied, just as a sanitary engineer will see to it that none of the sluices and outlets which keep the health of a town, is allowed to get water-clogged. If, however, we persist in blindly adhering to an arrangement prejudicial to our interests, it will result sooner or later in confusion as is already in evidence in the general unrest all the world over and especially so in India. It is sound economy to rely on the principle of the division of labour, both intellectual and manual, and there seems to be no justification

to upset it by encouraging *en masse* all classes to pursue any course according to their own inclinations on the plea that one's caste is determined by one's inclination and not by the fact of one's birth. It is equally dangerous to allow people to run after a prevailing fashion to the exclusion of attention to their common needs. Surely there must be room for freedom of choice, but unless this freedom works within the limits of the approved lines already referred to, disaster is bound to ensue.

Principle of the division of labour and its utility (contd.).

We must confess that our young men are being ruined by the blind encouragement of a uniform system of education for all, as plainly admitted by the late Vice-Chancellor Mr. B. N. Basu of the Calcutta University, and the same folly is being perpetrated with regard to our women who are required more to be industrious and to be the backbone of *faith*, *love* and *chastity* in every home than to be musicians and literary critics. The whole test appears to be what the community wants and what will contribute to its well-being, and not individual interests and sentimental ideas. It is quite easy to make this determination a controversial matter. But good counsels are expected to prevail and to satisfy the test mentioned, everything else in conflict with it must be sacrificed, it being a grand Truth noticeable in nature from selection, elimination and growth that by apparent sacrifice there is re-juvenation instead of annihila-

Evils of a uniform system of Education for all.

Root meaning of Education.

Evils of a uniform system of Education for all.

Root meaning of Education (contd.).

tion. This sacrifice or "giving out" is just what is apparently implied by the root meaning of Education (*e*, out, and *ducere*, to lead), as opposed to "taking in" or instruction (*in*, and *struo*, to pile). The Sanskrit equivalent of education, namely, *Sikhsha*, also implies the same ideal of an unflinching standard for our conduct which recalls the great teaching of the Founder of Christianity that a man is judged by what he gives out and not by what he takes in. This is a lesson which is meant for all, particularly for those who are anxious for education.

**Education and the Development of the inner self.**

Sacrifice as the highest ideal in, and the essence of, Education.

Looking into the great religions of the world we find that it is the sacrifice which constitutes the goal of education of all religions. It was the sacrifice of Lord Budha, Lord Jesus and of Christian martyrs which built up Budhism and Christianity, respectively. It was the sacrifice of Mahomed which gave birth to Mahomedanism. It was the sacrifice which came out so prominent during, and which eventually won, the last War. More recently it was the sacrifice which was the outstanding feature in the life of the late Mr. C. R Das and which evoked universal homage in tribute to the memory of the deceased. We can call a nation illiterate but hardly uneducated if the members thereof are capable of showing great patience and great sacrifices. Education is not necessarily and wholly literary,

scientific or artistic. Education pertains to the inner self which expands in various ways and through various agencies and this development of the spirit within is the goal of, and nothing but, Education. Sacrifice, love and charity symbolise the manifestation of spirit. An individual, a family, a community or a nation may be regarded as educated when sacrifice happens to be the key-note of their actions. We remain far behind the educated condition so long as there is strife or competition for winning for himself and not for living for others. This is the ideal we must live for.

Sacrifice as the highest ideal in, and the essence of, Education, (contd.).

### Education and National weal.

Bearing this high ideal of altruism in view, one cannot strive better for the national weal than to devote some daily service to the nation's up-bringing and to national uplift. The best conceivable form of rendering service to suit all conditions of life is to contribute some work in kind when we cannot pay in cash. The simplest is no doubt half an hour's service with the spinning wheel, the needle, the sewing machine and so forth. It was a masterly effort for sacrifice and concentration when the whole motherhood and sisterhood were busy at the needle and the sewing machine during the war to keep their soldiers warm in the field. Some form of agriculture for use *to yield similar national service* may be cited as next in importance. The inborn love of the Western people for plant life

Simple methods of rendering national service.

**Simple methods of rendering national service (contd.).**

as articles of house decoration, of the Hindus for the *Tulsi* (Ocymum Sanctum) and for the cow as emblems of faith and devotion, and of the Mahomedans for poultry as food articles, suggests Horticulture, Drug Culture, Dairy Farming, and Poultry Farming. These agricultural pursuits which may be run both as cottage and organised industries, are paying lines, highly scientific and of great educational value for men and women, for the rich and the poor alike and as such practical science in any shape, which is no less in the spinning wheel if rightly pursued with the allied work of dyeing, bleaching, sizing, etc., is designed to impart a new turn to national education and a new force for the nation's up-bringing. What is needed is that our thousands of students who matriculate, also their guardians, should find what practical science means and what its scope is.

### Education and Castes.

**Advisability of following hereditary occupations.**

It is, however, never contemplated for a moment that all energies should be pooled together to be let loose on the development of practical science only. India's past greatness still reveals itself through her expression in art, literature and religion and these channels must be kept widened more and more instead of being narrowed. Let the best talents in each sphere and walk of life be provided with all possible facilities so that a common labourer, if talented, may rise to be a

Pope or a Premier. But it is a suicidal blunder, indeed, to allow the mediocre and the weaklings to forego their hereditary occupations and to crowd the already overcrowded professional and literary lines. There is no question of compulsion, nor is it proposed to make people sensible by legislation. It is in the interests of every father, every boy and girl to strain their vision a little. They may remember that the occupation of every caste is equally responsible, respectable, and remunerative in the economy of social life, if the resources of up-to-date scientific knowledge are brought to bear on the development of the caste occupation in question, as explained elsewhere under "Vocational Education" in the next chapter. Without this conviction there will always be a scramble for the loaves and fishes supposed to exist in a particular line with the result that there will be a hopeless confusion and that no communal and national progress will be possible. Such communities as are, however, free from caste restrictions, may insist on their members generally following their family or father's occupations and each village, which is not yet uninhabitable, may organise itself by co-operation to meet their local needs and to develop their local resources, arts, industries, education, religion and social amenites, thereby forming *real educational colonies* on the spot instead of going elsewhere in pursuit of fantastic schemes

Advisability of following hereditary occupations (contd.).

Advisability of following hereditary occupations (contd.).

which are likely to disappear like South Sea Bubbles and to end in liquidation. No doubt a proposed new organisation may have its advantages, but it has risks as well. It is safer to to revive, if possible, and to modernise a potent organisation in our village life at a less cost than to transplant this very thing on to a new soil at a much higher cost. In fact, there is no merit in giving a new name to an old thing and to run risks at the same time.

### Education and Social Service.

Village Reconstruction as an extension of social service work.

Finally, it may be mentioned that India is 90 per cent in villages and 10 per cent in towns and that this extensive village life which is being denuded of its joys and prosperity by insanitation, disease and proverty, one following the other on its heels by moving in a vicious circle, presents a huge field for social service work on an unprecedented scale. We cannot give up village reconstruction on the ground that there is no social and intellectual life in existing Indian villages and that conditions there are intolerable for the *intelligentsia*. Co-operation and sacrifice through social service will mostly revive what appears to be irretrievably lost. There is no better grounding for substantial education than social service work and although we may argue by reference to sacred books and to grand-mother's stories that India's past life was one of continuous social service, we

must admit we are deeply indebted to the Christian influence for a new start in social service work which is a very hopeful sign for the future. India was asleep all these years and the Christian influence which has no doubt roused her will itself stay to be roused. There is already a stir in the Christian section of India and this will continue until the Anglo-Indian and the Indian Christian communities are thoroughly awakened as to their duties and as to the necessity of selecting their lines of activity from a broader outlook. They are apparently under a delusion that they possess a better system of education and that they have a prescriptive right to certain privileges. But they equally need to be taught the principles of *sacrifice* and *self-help* as the bases of education. No community in India can detach itself from the rest and ignore the general principles without the inevitable consequence that the entire Indian family must either remain diseased and be subject to decomposition or make a combined and Herculean effort to cure itself and to set its house in order.

Village Reconstruction as an extension of social service work (contd.).

### Right Methods of Education.

Most of the preceding remarks refer to the fundamentals underlying the meaning of education. Unfortunately these may not generally appeal to the common run of people in educational institutions and in their interests we may conclude this chapter with a few remarks on

Indifference of the average run of people to essentials of education.

what may be considered to be the right methods of education as pursued at schools, colleges and University centres.

**Need for a systematic course of physical training for school and college students.**

In moving on 1st August 1925 the adoption of the report of the Committee appointed by the Calcutta University Senate to consider the question of imparting physical education to students reading in schools and colleges recognised by or affiliated to the University, Sir Nilratan Sircar said that the University had only adopted the intellectual side of the western system of education but had altogether neglected the physical side. Although this regrettable admission came rather late after a great deal of mischief has been done to the general health of the student community in general and to that of the Bengalees in particular, it is never too late to learn and to mend one's ways as a result thereof. The need for a systematic course of physical training while under education occurred to the writer a quarter of a century ago and in a paper read at a meeting of the Simla Hills Friends Union, he urged his friends to pay particular attention to the physical training which alone would ensure health, a valuable asset of life either for material advancement or for happiness in any shape, and suggested a method which promised to be a source of income instead of a drain upon their resources. The suggestion was to create a River Transport Service and to employ in batches school and college

students in the Gangetic and other river areas in the plying of such boats as the students themselves would gradually build, buy or otherwise acquire by co-operative methods. This suggestion, it is submitted, seems to deserve a careful consideration by all concerned now that the Bengal National Chamber of Commerce ask for the protection and encouragement of the inland maritime trade conducted by the "children of the soil."

Need for a systematic course of physical training for school and college students (contd.).

Starting from one ferry boat the organisation contemplated was designed to form a nucleus which might eventually develop into an Indian Mercantile Marine owned, officered and manned by students. In other words, the proposed organisation was to make a start by converting, in the first instance, Rowing and Yachting Clubs into paying concerns with additional advantages of providing useful courses of instruction in physical training, also in developing resourcefulness and power of endurance. The writer is, however, aware that there are sections of people who think that the suggestion is not feasible as it is not in the nature of young men in schools and colleges to take to sports otherwise than for fun and recreation only. Whatever may be the general feeling hitherto in this respect, it is true that circumstances are changing and that the students are expected to do in the future what they were never called upon to undertake in the past.

Physical training on profitable lines instead of for fun and recreation only.

**Indian educational problem as perhaps the most difficult and pressing in the world. Suggestions for facing the problem.**

It is gratifying to note that the university authorities as well are steadily rising to the necessity of the occasion and seem prepared to tackle questions which appeared impracticable or unnecessary a few years ago. Addressing a distinguished audience the other day at London, Dr. P. J. Hartog, Vice-Chancellor, Dacca University, characterised the Indian educational problem as "perhaps the most difficult and pressing in the world" and suggested that the real opening for the employment of the educated middle classes on a large scale would lie in the education of the illiterate millions. He, however, safeguarded himself by saying "that he regarded it as essential that the agricultural classes should remain agricultural classes, though they should be trained to a higher degree of efficiency." This is exactly the view which the School of Chemical Technology, Calcutta, has ventured to uphold since its establishment in 1919 and which it has been consistently pursuing in the series of articles published from time to time on the subject of Technical and Technological Education. The efficiency referred to by Dr. Hartog could be provided by technological education only and, as explained in the school's articles, a rough and ready method is necessary to convert the bulk of the unemployed educated classes into efficient materials for training the illiterate millions. These educated classes are apparently and generally

useless unless they *first* undergo some sort of technological training through short and intensive courses just to enable them to carry on their propaganda of teaching and, *secondly*, are content to live on small remuneration which may be rendered available by the joint efforts of municipalities, district boards and local unions. Indian villages still retain to some extent their original spirit of hospitality and, with the help of *panchayats* and *mandals*, may be encouraged to set apart their best accommodation and food for the reception of their new *gurus*. These educated *gurus* will no doubt feel handicapped for some time owing to their lack of sufficient technical knowledge, but they will soon adapt themselves to their new environments and duties and will generally prove more satisfactory than the expensive experts of technical departments. The system of existing education has been tried and found wanting. Let us now direct it in a new channel, as suggested by Dr. P. Hartog, applying the declared principle not only to agricultural classes alone, but to all classes throughout.

Indian educational problem as perhaps the most difficult and pressing in the world. Suggestions for facing the problem (contd.).

The declared principle is that agricultural classes must remain agricultural in spite of their higher education. The principle should not end here abruptly, but must be extended to other industrial classes as well. The question is one of Technological Education for the masses, also of how best to carry it, and is dealt with in the next chapter.

## CHAPTER III.

### Technological Education

#### H. E. Lord Reading's advice.

**Definition of Technological Education.**

In discussing in Chapter I the aim of higher training in Technical Education, we referred to the "application of science to manufactures, to mining, to agriculture and to sanitation" as Technological Education, thereby drawing a distinction between the lower kind of Technical Education as pursued mechanically in workshop training and in the practice of a handicraft, on the one hand, and the higher kind, on the other, as consists in the study of higher science in order to make it *productive* intead of *academic* and generally confined to the cramming of text book information onty. It is the productive side which is still almost non-existent in India and apparently this fact was in view when, at the inaugural address before the Universities Conference at Simla in May 1924, H. E. the Viceroy, while speaking on the influence of education and of the rapid strides made by university education in India in less than a decade, frankly observed that "nevertheless we should not rest complacently on our laurels." Continuing His Excellency remarked—"We cannot conceal from ourselves that we have a vast field still to cover.

**Lack of productive education.**

"If the highest standards had already been reached we should not find so many of our brightest students leaving India to complete their education and to seek degrees in England or foreign countries. We must confess to a need for further development in many directions, more especially in the higher technological education." In reviewing His Excellency's address in the *Statesman* of May 21, 1924, the Editor, however, seemed to hold that it was the requirements of industry that stimulated technological education—"first the need, then the capital, then the industry, last the trained men." Whoever may be holding this view, it must be distinctly understood that India was not and will never be an industrial country in the sense of "industrial" as understood in the West.

Need for Technological education.

### Technological Education and Village needs.

About 92 per cent. or more of India's population are agriculturists or are dependent on agricultural products and India is not a country of towns, but of villages. Agricultural and village needs consequently loom large in India's requirements. If these requirements have to be given the first and foremost attention, technological education must undoubtedly be given the precedence. Scientific agriculture and public health work are nothing but technological education phrased differently. Investigations in regard to these lines are now more or less confined to isolated centres and they can

India, an agricultural country.

Development of agriculture, etc., by diffusion of Technological Education.

Development of agriculture, etc., by diffusion of Technological Education (contd.).

only reach and benefit the people at large if knowledge thereof is diffused and made to spread by suitable methods independent of artificial standards and restrictions generally imposed by universities.

### Technological Education for the masses.

Object of Technological Education.

There are at least five per cent. of the people of Bengal who seek employment or are absorbed by the professions, such as law and medicine, and whom we call the *bhadralog* class. Ignoring the narrow and circumscribed view which regards education only as a means for employment and which is entirely foreign to the meaning as explained in the preceding chapter, we cannot but accept the necessity for providing profitable and independent means of subsistence when there is such overcrowding in the avenues of employment now open, leading to discontent and unrest almost everywhere. Technological education is desired not so much for finding employment for the unemployed in mills and factories, as for employing them, independent of all service, *first* on the land in the pursuit of higher agriculture, *secondly*, on the betterment of sanitation in towns and village areas and, *thirdly*, on the development preferably of home or cottage industries by the application of science. There is enough of scope for small industries under individual control in almost every home either by mechanical means, such as the *charka*, sew-

ing machine and other similar appliances coupled with such scientific work as dyeing, bleaching, sizing, glazing, cutting, or by pure scientific methods, such as (*a*) manufacturing fertilisers, weed killers and other scientific products; (*b*) microscopical examination of seeds, plant diseases and other specimens; (*c*) bacteoriological examination of pathogenic germs and preventive measures therefor; (*d*) making and repairing scientific instruments and appliances; also industrial implements, plant and tools, and in other numerous ways.

Object of Technological Education (contd.)

### A workable scheme.

Lastly, a decent proportion of the *bhadralog* class may be employed as teachers, as is referred to elsewhere, p. 34, if we adopt and carry out a workable scheme of technological education for India, which will provide a sort of network connecting isolated centres like Pusa with the remote village organisations. Our highest *intelligentsia* may for a period forego the glamour of honour derived from investigations of the kind of whether the Earth's orbit is elliptical or circular and may preferably engage themslves in such nation-building work as technological education in its relationship to agriculture, sanitation and industries. This arrangement need not be associated with a long and expensive course as contemplated by a medical or other university curriculum; but a short and easily attainable

Extension of Technological Education preferably by simple methods.

**Extension of Technological Education preferably by simple methods (contd.).**

course designed to suit all classes and communities where they may be located and conducted by practical methods, is more likely to succeed and to solve the bread problem than many ambitious and futile schemes now put forward.

### The Hard Facts.

**Summary of suggestions.**

The various suggestions made in the course of discourses in this book with a view to stimulating and widening Technological education, may provide food for serious consideration by young men, women and their guardians, and for their convenince we may summarise what hard facts they must bear in mind. Roughly these are :—

(1) that the present struggle being one of "the survival of the fittest," the days when employment was readily available simply on the strength of some educational qualifications, or through personal, social and communal influence, are definitely gone ;

(2) that service is not the only profession worth looking for, an extremely limited number being employed thereby in all countries ;

(3) that the bulk of the people and of educated classes in any country normally earn their livelihood *independently* by trade and by pursuing industries, *agricultural* or otherwise, according to the natural resources and requirements of a country as determined by its political, geographical, climatic and ethnographical position ;

Summary of suggestions (contd.)

(4) that it is not always possible nor desirable to transplant foreign ideas and methods on to a different soil ;

(5) that, in consonance with the Law of Heredity, it is generally easier and more desirable to follow one's caste and family occupation if unobjectionable on moral and economic grounds or, in its absence, such other occupation as may be suggested by a careful consideration of all circumstances, particularly natural aptitude and extent of existing encouragement therefor ;

(6) that "education" does not mean literary education as hitherto offered by Indian universities ;

(7) that it is an unwarrantable waste of manhood and money to try to be a graduate and to attach to it a value which does not exist ;

(8) that it is an abuse of science to stick to its theoretical side only and to book knowledge ;

(9) that education in several branches of "applied science" is the only way to promoting agriculture, industries and sanitation absolutely essential for the material progress of a nation ;

(10) that, although facilities for this sort of right education are still very much restricted in this conutry, full advantage should be taken of any that is forthcoming ;

(11) that continued personal effort or *self-reliance* alone, and not graduation nor patronage, counts for success ; and

Summary of suggestions (contd.)

(12) that, speaking generally and considering the time, money and energy spent ungrudgingly on general education and on various agitations, a short, special and intensive training in "applied science" immediately after matriculation, or on attaining other equivalent qualification, or even strong common sense and general intelligence as the case may be, is more likely to give far better results educationally and morally ; also a better certainity of decent livelihood, more self-respect and steadier communal progress than any indiscreet clamour for a share in administration, for higher literary education, post-graduate courses, larger franchise, Indianisation of services and so forth.

### What will save a nation.

Right place of cultural education in the economy of social and national life.

It must be distinctly understood that poetry, philosophy, history, literature and logic, as also their application to the creation of a class to meet the demand of public and private services, courts, schools and offices, will not ordinarily save a nation ; that culture on these lines and in pure science should remain confined to people of ability and wealth and that industrial and agricultural classes who represent more than 95 per cent. of the population, require such practical education in "applied science" as will improve their trades and crafts and enable the masses to live in comfort. Let all who have ears to hear and eyes to see, think for a while whether it is not time

Need for more attention to practical education.

that they changed their views of education and did what they could to lead them to health and prosperity. The subject is indeed a complex one and we return to it in our next discourse on vocational education.

Need for more attention to practical education (contd.).

## Vocational Education on Caste Lines

### Use of Vocational Education.

The Teacher's Conference held early in 1921 at the Senate House, Calcutta, passed a resolution in favour of including vocational subjects in the course now prescribed by the Calcutta University for the Matriculation. According to an Associated Press message which appeared in the *Englishman* of May 13, 1921, the Punjab University proposed to go a step further and to extend the vocational courses to the Intermediate standard. It, however, remains to be seen how the fundamental change involved thereby in the educational outlook of the country is given effect to and what fruit it ultimately bears. In the course of discussion at the Calcutta Conference views were expressed from which it appeared that there was a misunderstanding as to the ultimate object of vocational training in schools. Is it intended that our school boys who generally come from the middle classes are to be trained to make a living as artisans while the latter, under the present system of education, have so long been en-

Inclusion of vocational education in school curriculum.

Misunderstanding as to the ultimate object of vocational education.

**Misunderstanding as to the ultimate object of vocational education (contd.).**

couraged to abandon their hereditary careers in order to become clerks, lawyers and deputy magistrates? It was reported that, during the early part of the last great war, unsystematic recruiting led to an alarming depletion of skilled labourers in all branches of industry while simultaneously men from active service had to be recalled to keep the industries going. If so, this was confusion worse confounded. A similar position is likely to arise in our schools if the object we are aiming at by introducing vocational subjects happens to be misunderstood. Economic troubles have apparently forced us to change our angle of vision with regard to education. Since the introduction of western education into India we have used university qualifications as passports for admission into different services and professions which have hitherto been found to be more paying and carrying more influence than the occupations followed by traditional methods. This method of recruitment is generally believed to have upset the equilibrium in our civil and industrial life and there is a widespread feeling that we have brought ourselves to the verge of being engulfed in the chaos which we ourselves have created. From a false conception of education we have allowed a system to develop, which is pronounced by some to be prevailingly literary and by others to be pre-eminently unpractical. We are also responsible for the persistent notion obtaining in some quarters

**Economic troubles, our own creation.**

**A false conception of education.**

that there is a social status attaching to university education and that this status is hardly attained until at least the B. A. degree is obtained.

A false conception of education (contd.).

### Putting the cart before the horse.

A sad feature of Indian life to-day is the number of young men who have matriculated and won all kinds of academic honours and degrees from the universities and yet are unable to obtain employment. There was a time when the mere knowledge of English was sufficient in India to open up avenues of employment to the class which is above manual labour. To day more is wanted, if not expert industrial knoweledge, at least the ability to keep accounts, or type or write business letters. The universities have not moved with the times and are still turning out by thousands men with literary qualifications only. In order to obtain their degrees many of these students have passed through periods of great self-denial, and now they find that a degree is practically worthless in the labour market. It is now adding insult to injury to preach to these young men the dignity of labour. We have so long failed to define what education is. If education means that which teaches a person to do his duty well, a B. A. is no more educated and useful than a fireman or an engine driver who has learnt to do his work well. The subject has been more fully gone into in a preceding chapter and it may only be added that we have placed

Present sad feature of Indian life.

Depreciation of the market value of university education.

the cart before the horse by making education subservient to employment instead of in the other way. It is rather more natural and scientific for a pupil's paternal or caste occupation to determine the nature of his education than to leave him to chance. Under education according to one's caste, etc., it being always possible to provide for exceptions, the pupil's occupation is always kept ready for him and no risk of unemployment arises on completion of education. It is no doubt human nature everywhere to seek ease and comfort and to seize better opportunities wherever available. But it appears to be a sound policy in the long run to perish in one's own family occupation rather than to covet what is not his.

Nature of education to be determined generally by a pupil's paternal or caste occupation.

### The way to Success.

Scope for education in every sphere of life.

There appears to lie a vast scope for educational attainments even before the humblest labourer who is anxious to be educated according to the above mentioned principle. Let him understand that his proper subject of study is some branch of Applied Science which alone will enable him to make the best use of his opportunities and of the facilities generally transmitted by the Law of Heredity. If he has parts, he can turn out a Mechanical or a Sanitary Engineer, a Chemist or an Agriculturist, and adopt scientific methods, thereby enriching himself, perhaps to be a

millionaire, and developing as well the resources of the country. There are opportunities for educational and economic progress in each sphere if the hereditary members thereof were only told what to study and how to employ themselves, the branches of Applied Science and industries built thereon being quite numerous to suit all classes and to provide better chances of success for a larger number of people than under the present system of education. Moreover, education adds dignity to labour and changes the whole outlook. For instance, if provided with facilities for a scientific training, *a dhobi* is likely to be a better textile chemist, and a *chamar* a better leather chemist, than a *Brahmin* M. Sc. and the former has the additional advantage of either falling back upon his own trade on necessity arising or of devoting his whole attention thereto from the very start. Similarly, a sweeper, a barber, a weaver, or whatsoever he may be, may take up a subject which will either improve his own calling or train him in a line more or less allied to his own. It is no good to be cut off from one's own family occupation under a plea of education as now and to look, at a later stage, for employment when there is none for him. It is not shutting the door of education to advise that one should *ordinarily* stick to his caste or father's occupation and that his time table up to the highest qualification needed, say M. A., M Sc. or any other equivalent standard, should be

**Special kind of education for labouring and industrial classes.**

**Open door to higher education not interfered with by a special kind of education.**

arranged for accordingly. The advice, on the other hand, is designed to keep wide open all the avenues of employment, rather allowing them to be developed freely with better education and broader outlook. If so, there will be no congestion in a few selected lines as at present, and instead of a uniform brand of education for all classes of people, which appears to be the greatest drawback of the existing university system, evening classes may be allowed to grow not only for primary education, but also for secondary and university work. The day classes, as also educational workshops and farms, are to meet the needs of the people who have no family occupation or land to depend on and if it is understood from the outset that education is designed not to make of us *servants*, however dignified, but to get the best of us as *independent* workers, more inclined to help others, to be self-reliant and to promote the common weal than to seek one's own interest as is generally the case with the so-called educated classes, the nation will advance not only in wealth but also in health and happiness.

## CHAPTER IV.

### Chemistry and Progress

#### Chemistry in the Twentieth Century.

Dr. Armstrong and his views.

The views of Dr. Armstrong, F.R.S., with regard to Chemistry in the Twentieth Century, which appear in the course of a preface to a book on the subject, ought to arouse more than passing interest out here inasmuch as they have a particular bearing on Indian education and on the problems waiting to be solved by a change in our existing educational system. Dr. Armstrong is a well-known organic chemist, and is President of the Society of Chemical Industry. But, unfortunately, organic chemistry is more or less a neglected subject of the university curriculum in this country compared with the time and attention paid to other subjects. Even with greater attention and more practical work now insisted on, Indian university education in science is still largely academic, being confined generally to book learning and to theoretical calculations, of hardly appreciable practical value, and it will be some years before science here attains the stage which will directly lead to, or popularise, scientific agriculture, industries and sanitation.

### Chemistry and modern civilisation.

Amazing progress of modern chemistry

So far as chemical industries are concerned, hardly anything noteworthy is yet traceable to Indian university teaching, and one should not be surprised if industrial education in this country remains generally confined to carpentry and smithy, to clay modelling and basket weaving, or to mechanical and electrical engineering only. These subjects, although extremely useful in their own way, are not meant to leave us blind to the claims of other subjects and to the amazing progress achieved elsewhere. Speaking of the recent development of organic chemistry, Dr. Armstrong writes that "it is next to impossible for the layman to form any proper appreciation of how far the results of chemical science are of influence in daily life, still more to what an extent they are likely to come to his assistance in the future." In fact there is hardly any line of modern civilisation which does not require the service of chemistry in some shape or other and although we may think of only mechanical work in reference to technical education, a mechanic in any shape enhances his value if he studies chemistry, which underlies his vocation in life.

Chemistry and its influence in daily life.

### Chemistry and Agriculture.

Agricultural development by chemistry.

It is rather due to a confusion of ideas that we compare agriculture with chemistry with a view to appraising their relative merits. It is true that

Agricultural development by chemistry (contd.).

India is pre-eminently an agricultural country as already mentioned in preceding chapters, and that India's economic progress lies in her agricultural developement; but it is equally true that agriculture without chemistry is meaningless and inert. Scientific agriculture is what is designed to turn a barren land into a fertile area and to grow two blades of corn where only one grew before. Much of India's happiness will be promoted if this basic industry of the country receives a new impetus, with practical results, as foreshadowed by the recent speeches of Lord Birkenhead and of H. E. the Viceroy and by the transfer of the Right Hon'ble Mr. Wood from Agricultural Ministry to Viceroyalty. The progress desired is only possible by the aid of chemistry, entomology, mycology and bacteriology, which are more or less interdependent. Praise is due to the Imperial Department of Agriculture for the valuable work at the Pusa Research Institute. As, however, this Institute owes its inception to the munificence of an American gentleman, who made a princely donation of four lakhs and a half rupees, it is equally expected of the generous public, of the State and of the municipalities, to develop and support such schools of chemistry as will stimulate chemical industries and provide the backbone of all kinds of industrial and agricultural development These schools may not be fortunate enough to be able to boast of complete and magnificent equipments, of palatial

Pusa Research Institute.

**Useful work by humbler institutions.**

buildings and of extensive grounds, but the useful work carried on in a humble laboratory under capable teachers, consistent with the traditions of India, will make its effect felt far and wide by bringing the required education within the reach of all communities and of all classes, even with a modest education and with restricted opportunities for qualifying. The training afforded may not be of the highest kind, but will be enough for turning out useful assistants and understudies, thereby extending the ground if not adding to the height, and thereby employing especially a large number of unemployed Europeans and Anglo-Indians who will find this practical scientific work more congenial to their tastes, status and education than clearing jungles in out of the way colonies and working in mines under unsuitable conditions.

**Details of a practical scheme.**

### Sir J. C. Bose and scientific agriculture.

**Diffusing practical knowledge by small laboratories.**

The greatest impetus imparted to scientific agriculture and to agricultural research by Sir J. C. Bose is destined to revolutionise agriculture and his crescograph and other instruments, the products of his inventive genius, may someday be popular things in small technical laboratories where plant assimilation, fertilisers, foods and drugs will be freely studied, combining chemistry with agriculture and public health and diffusing practical knowledge to the nooks and corners of India. Sir P. C. Ray's efforts in the College of Science,

Calcutta, cannot be underestimated; and the only hindrance there experienced, also in humbler institutions, is the want of adequate funds to continue such useful research work. It is, therefore, the duty of the generous public, of Government and public bodies, municipalities and district boards, to subsidise such schools as are trying to train both men and women in practical lines of employment, giving them the aid of a sound technological education.

Diffusing practical knowledge by small laboratories (contd.).

## Chemistry and Technology

### Professor Thorpe's views.

In the preceding discourse on "Chemistry and Progress" attention is drawn to Dr. Armstrong's views with regard to "Chemistry in the Twentieth Century," to their bearing on Indian education and to the steps that can be taken in this country to stimulate chemical industries generally and scientific agriculture particularly. In the discussion on "Technological Education," Chapter III, reference is made to Chemical Technology in its relationship to (1) agriculture, (2) industries and (3) sanitation. It is extremely gratifying to note that both (1) and (2) are convincingly dealt with from a chemist's point of view in a paper by Professor J. F. Thorpe. Both Doctors Armstrong and Thorpe are eminent organic chemists and their

Further opinion.

**Further opinion (contd.).**

views, coming as they do at the present juncture when the need for the higher technological education and "scientific agriculture" has been emphasised by H. E. the Viceroy and particularly when the latter is likely to form the subject of enquiry by a Royal Commission, should command deserved attention.

### Chemical education.

Dr. Thorpe prefaces his remarks by a reference to the Indian Industrial Commission, 1916-18, and summarises the conclusion he has arrived at as a result of his tour through India during the cold weather of 1919-20 and as a chairman of a committee appointed to "formulate proposals for the organisation of a chemical service for India and for the location and equipment of research laboratories." Dr. Armstrong, Dr. Thorpe, as also the Indian Industrial Commission, are unanimous in respect to the absolute necessity of chemistry for developing agriculture, and various modern industries. It is organic chemistry, a subject which is still neglected in India, that will assist (*a*) in promoting scientific agriculture, adding to the wealth of India by crores of rupees, and (*b*) in the commercial and scientific exploration of forest products, dyes, drugs, oils, perfumes, coal, leather and sugar. Inorganic chemistry, which is more in evidence in Indian universities than organic chemistry, is useful for developing mineral wealth and metal-

**Absolute necessity of chemistry.**

lurgy. The unfortunate part, however, is that the conditions in Indian universities are, as is observed by Dr. Thorpe, not likely to improve if the evidence given by the Educational Commissioner with the Government of India represents the settled and considered opinion of educational authorities.

Absolute necessity of chemistry (contd.).

### Chemical Technology.

In paragraph 135 of the Indian Industrial Commission Report it was observed that "the system of education introduced by Government was, at the outset, mainly intended to provide for the administrative needs of the country and encouraged literary and philosophic studies to the neglect of those of a more practical character." A similar opinion was expressed by the Government of India so long ago as in their resolution of the 18th June 1888 on the subject of technical education; and unless the whole view of education in India is radically changed, and the technological side given as much importance as the literary side, there hardly appears to be any hope for an early improvement. Lakhs of rupees have been spent by Calcutta University in bringing its science teaching up to date, but it is feared that, if science professors are without factory experience, their researches will generally result more in the production of scientific curios and unproductive mathematical calculation than in the development of industries which can hold their own against competition. It is de-

Need for changing the whole view of education in India.

**Need for changing the whole view of education in India (contd.).**

clared more than once in this volume that pure science researches are extremely necessary and that, in many instances, they form the foundation of industrial developments. What is, however, objected to, is that there is more attention to pure science than to "applied science" in this country and that the latter is often taken up by those who have at least no business experience in the line and who consequently fail to make it a business success. What is needed for practical purposes are more of scientific vision and imagination than of mathematical calculation.

### Technological Education.

**Reasons for encouraging Technological Education *en masse*.**

Owing to the present financial stringency it may not be possible in the near future to give effect to the recommendations of the Indian Industrial Commission and of Dr Thorpe for the creation of a chemical service for India, but there appears to be no obvious reason why we should not have half a loaf instead of nothing and encourage ordinary schools of chemical technology throughout the country, as suggested in preceding discourses, in order to disseminate right ideas far and wide and to let the *ryot* and the worker feel what is required for the amelioration of their agricultural, sanitary and industrial conditions. It is never intended to exclude literature, arts, pure science and philosophic studies, but it is imperative that *pari passu* with refined culture by literary edu-

cation and the creation of an improved artisan class by primary and technical education, the *intelligentsia* should take to technological education to save their country from starvation and to solve the knotty problem of unemployment irrespective of castes, creeds and colour. All that is required, therefore, is that the people of all classes and communities in India should co-operate and wholeheartedly assist in agricultral, public health and industrial enterprises with Indian capital by taking the initiative and by helping where and when a help is really needed, so that in the end the country and its masses may benefit in material resources rather than that a few intellectual giants may be created who will achieve world-wide renown.

Reasons for encouraging Technological Education *en masse* (*contd.*).

**Greatest good of the greatest number.**

Intellectual giants are no doubt necessary to improve the status of a country on the scale applying to the commonwealth of nations and this country is indeed proud of such luminaries as arise in the Indian firmament now and then. The contention, however, is that there should not be an undue attention to one direction of culture or progress to the sacrifice of the needs in other directions and to our overlooking the universal principle of "the greatest good of the greatest number". This is the principle which one has to bear in mind and we must be discriminating with an unerring eye what

Reasons for encouraging Technological Education *en masse* (*contd.*).

is wanted first and what next. Health, food and raiment stand supreme in our requirements, and the resources of science and enterprise will have to be explored until these requirements are fully met.

## Chemistry and Health

### Lack of Legislation.

**Reasons for the existence of widespread adulteration.**

Writing to a Calcutta newspaper a correspondent made very pertinent remarks with regard to the dairy industry and dairy produce in India. He rightly observes that the principal reason for the existing unsatisfactory condition of the dairy industry in this country is lack of legislation to protect the up-to-date scientific dairyman from competition with the people who do not understand the most elementary principles of the theory and technique of their vocation.

He tells us that "there is no legal standard, that the system of inspection and analysis that is in force, is haphazard and incomplete and is consequently worse than useless and that our legislators need not fear that in passing laws they will be raising the prices of milk and ghee." All right thinking people will no doubt agree with him that "to encourage science and capital into the dairy industry there must be such legislation as will effectively prevent the sale, as pure butter, of a concoction of butter, fat, banana or potato flour." This legisla-

tion will accelerate the scientific training of uneducated dairymen and will be a step forward for popularising technological training among the masses.

### Amateur Analysts.

These remarks apply not only to dairy products but to all articles of food and drugs. It is true that provisions have been made in the new Calcutta Municipal Act of 1923, Chapter XXVIII, sections 405-25, to check adulteration in these lines. But these provisions are restricted to Calcutta Municipal limits whereas the trade of a town is chiefly dependent on supplies from outside. Moreover, adulteration cannot be prevented by amateur and improvised analysts who look up to some thing else as their normal vocation.

**Inadequacy of provisions for preventing adulteration.**

### Overburdened Medical Curriculum.

It is a phenomenon perhaps peculiar to India alone to expect medical practitioners to be analysts without sufficient previous chemical qualificaion. There is a further drawback out here in the recruitment of analysts from the medical profession. Indian Medical Colleges are at present so overcrowded that *ordinarily* it is hardly possible for one to obtain admission unless he is a B. Sc. or preferably an M. Sc. This rule may be changed ; but coupled with a long preliminary training which is hardly called for and which is consequently a wanton waste of time and money, the hardest and the prolonged course which awaits him at the Medical

**Difficulties in the recruitment of analysts from the medical profession.**

**Difficulties in the recruitment of analysts from the medical profession (contd.).**

College, is so taxing to his body and brain, already wearied in most cases by overwork and other causes, that an average medical graduate on emerging from his ordeal is often worthless professionally according to the editorial article of the May 1924 issue of the Indian Medical Gazette, which writes.—"The medical course at the present day is so overburdened that few even of the best students emerge with a clear conception of what they have been taught, while the average student has confused ideas and is unfitted for his life work." If the result is so disappointing as regards his medical work which absorbed more than 80 per cent of his time and attention during the long six years' training, his chemical efficiency judged by this standard will be far more disappointing and hardly deserves mention. The Indian Medical Gazette article concludes with the suggestion that the entire medical curriculum should be surveyed afresh and ruthlessly cut down where it is possible to do so without, it is understand, lowering the standard of medical education, and that a course of study should be mapped out which will include only the most essential matters.

### Analysts and Pharmacists.

**Analysts to be armed with a special chemical qualification.**

In these circumstances it seems to be preposterous to think of the appointment of a medical practitioner as an analyst without a special chemical qualification. Each line is a specialised one and one is not meant for the other unless we are prepared to sacrifice time, money and energy and

to re-build anew. Smilarly the University science course of a B. Sc. and an M. Sc. relates purely to general science under existing arrangements and includes almost nothing of the practical subjects, such as Pharmacology, Bacteriology, Applied Chemistry and Applied Botany, which are absolutely required for the qualification of an analyst. Further, there is the question of salary that may reasonably be offered to a municipal analyst in this country. If it ranges between Rs. 100 to Rs. 200 a month, a qualified medical graduate with his prolonged preliminary and subsequent medical training can hardly be expected to be an analyst conscientiously and to remain debarred from private practice. Other considerations apart, it is extremely advisable from the standpoint of salary alone that quite a distinct and selected course of study should be adopted, which a capable matriculate may undergo to qualify as an analyst or as a pharmacist—professions which are well recognised and which enjoy statutory status in almost all civilised countries except in India and which alone will remedy the evils complained of by the correspondent referred to in the opening paragraph.

**Analysts to be armed with a special chemical qualification (contd.).**

### Devoted Chemical Workers.

In two previous articles the importance of chemistry in respect to vocational education for promoting agriculture, sanitation and industries has been dealt with. In the present article stress

**Importance of chemistry for public health work and for any development scheme.**

**Importance of chemistry for public health work and for any development scheme (contd.).**

is given to that aspect of chemistry which is concerned with health, particularly with foods and drugs. The work connected therewith calls for a devoted class of analysts and pharmacists. There are thousands of them outside India, who earn their decent livelihood from their professions, both independently and as public servants, and who constitute an efficient body of scientists, contributing their share of researches towards the progress of science and holding their own against general competition for honours and distinction. There may not be money in the country for municipalities, district boards and the State to shoulder responsibilities alone. But private enprise backed by legislation, whenever necessary, may be freely encouraged to create out here these classes of chemical workers who will form valuable assets in any development scheme. A class of engineers, mechanical workers and artisans are necessary no doubt. But the brain of a nation desirous of progress lies more in the application of science to the development of industries and in exercise of scientific control. Without this control, so far as public health is concerned, either by fully qualified analysts and pharmacists, or preferably by an extension, in the first instance, of education in applied chemistry, it is hardly possible for the people to appreciate what pure food and standardised drugs mean and how and where they may be obtained. A slight check somewhere as to the

alcoholic content of a drug, or in respect of the specific gravity of a food article, may be arranged. But to call these incomplete measures as constituting scientific control appears to be nothing less than self-deception. Indian students show particular aptitude for scientific research and if their energies are once directed in proper channels by judicious educational schemes and legislative measures, unemployment and discontent, disease and insanitation will disappear and the country will progress by leaps and bounds.

## Medical Research and Pharmaceutical Education

### Preventive Medicine in India.

Epidemic outbreaks. Heavy mortality.

Under the ægis of scientific progress, sanitation has largely advanced elsewhere, and no civilised country seems to be so frequently visited with epidemic outbreaks as, unfortunately, often happens to be the case in India. The dreadful annual scourge of smallpox in this country claims a heavy toll of mortality, and, in spite of the magnificent efforts made by the authorities, both official and municipal, to meet the situation, the sufferings inflicted, the panic created and the loss of life involved, are awful. The pity is that the position could have been otherwise with better and practical education and more public spirit in this country, most of these sufferings

being preventable, as has been amply shown by the progress of preventive medicine in western countries. The Guindy Institute of Preventive Medicine at Madras, the Parel Laboratory at Bombay, the Central Research Institute at Kasauli and other such institutions elsewhere in India are doing extremely useful work. They all owe their inception and growth to the initiative and liberality of the British people, and while we are rightly proud of the dutifulness and the enthusiasm exhibited by several of our own countrymen under trying circumstances, we must always remember our deep debt of gratitude to the heroic band of the I. M. S. and the R. A. M. C., who have introduced the western system of medicine into this country, and who have so far maintained it at its present state of efficiency. Hitherto we have had a remarkably good supply of European medical research workers. Owing, however, to economic causes and to the gradual growth of an independent medical profession in India, there has been a falling off in the supply of best young men from British medical schools. Though we are not yet in a position to dispense with foreign medical help, recruitment difficulties offer an opportunity to Indian workers. It is now positively their turn to exert themselves and to do what they can, even on a humble scale, by their own efforts, scientific, patriotic and co-operative, instead of turning their eyes to a paternal government for every boon.

**Splendid work for India by the I.M.S. and the R.A.M.C.**

**Opportunities for Indian workers.**

Need for a spirit of research among the Indian medical profession.

Apart from small-pox, there are other terrible scourges which are decimating the people of this country. They require to be equally tackled and met with methods of preventive medicine. Thanks to the unflinching perseverance and genius of Sir Leonard Rogers, the scourge of cholera is not now half so dreadful as it was a few years ago. Several Indian medical practitioners are reported to have roaring practice and to have added lustre to the growing independent medical profession in this country, but the spirit of painstaking research resulting in the alleviation of human sufferings, or in the development of industries, is still sadly lacking among Indian scientists. It is true we have our Sir J. C. Bose and Sir P. C. Roy, but we want a Sir Leonard Rogers and a Sir Ronald Ross in the Indian medical profession, and must not rest contented until the spirit of these great men pervades each and every profession. The patient work of Sir Leonard in hospitals of Calcutta for over 20 years has demonstrated that the toll exacted by tuberculous diseases is no less appalling than in other cases. According to the analyses made by him 17 per cent of total deaths at Calcutta hospitals are due to tuberculosis. The statistics furnished by Dr. Lankaster in his book on Tuberculosis in India are not only informative, but extremely interesting. This disease accounts for over two thousand deaths annually at Calcutta, and crowded cities

and industrial centres in India are recording alarming mortality in this respect. Overcrowding and consequent lack of free air space—an evil of city life—combined with other causes, such as insufficient or unscientific dietary, poverty, sedentary habits and pernicious social systems, are contributing to the spread and prevalence of tuberculosis.

**Preventible diseases.**

These and similar other facts in regard to all preventable diseases, such as malaria, kala-azar, etc., must not be lost sight of. Several preventive and curative methods, including the latest one of gold (Sanocrysin) treatment, in order to combat tuberculosis, are getting in vogue, but all of them are still apparently in the experimental stage.

**Idiosyncrasies.**

The medical profession, whether belonging to the official or non-official class, who complain of superstition and ignorance overawing the people of this country against taking kindly to vaccination and other scientific methods, are equally to blame, if, which is hardly possible, they yield to idiosyncrasies of either over-prejudice against any new idea, however scientifically expressed, or of undue faith in proprietary remedies. Many qualified medical practitioners are found to patronise patent medicines—some perhaps carrying this habit to an excess and, in most cases, without apparently knowing scientifically what these so-called remedies are made of—and having regard to the exposure of a case in the London Daily Mail, this conduct of medical practitioners is perhaps no

less reprehensible than the ignorance and the superstition which we legitimately object to. What the country needs is research and more research free from bias and endowed with practical value, enough of partriotism and an all-round co-operation. These assured, progress and plenty, health and happiness are within our grasp. The Calcutta School of Tropical Medicine under the able direction of Lt.-Colonel Megaw, has begun very well in this line, and we are profoundly proud of the honour recently conferred upon Major Chopra, I.M.S., for his research work. There should be more such workers in the country, either within or outside the medical profession. The latter alternative of non-medical workers appears to assume greater force when it is remembered what an important part chemistry is playing in the domain of preventive medicine in dealing with havock of kala-azar and other diseases.

Need for more research. Example set by the Calcutta School of Tropical Medicine.

### Medical Relief and Scientific Pharmacy.

The medical science is a strikingly progressive branch of knowledge, and the rapid strides made of late have not only rendered it absolutely hard for medical students to cope with the advance, but have largely complicated medical education as well. It is, therefore, more commonsense-like and conducive to efficiency for medical students to concentrate attention upon a few essentials, namely, medicine, surgery and midwifery, while under training,

Medical research, a specialised work.

and to attend to specialisation after qualification, than to allow attention to be distracted by a overburdened syllabus and to prove failures afterwards as practitioners, as is mentioned elsewhere, p. 60. Much of the present day laboratory work, which is associated with a part of medical research, is assuming a specialised nature, and the line of demarcation between a general practitioner confined chiefly to clinical work and a laboratory research worker is getting more and more distinct.

**Medical research not so remunerative as private practice.**

It is unfortunate that a medical practitioner, whether in India or elsewhere, does not find his research work to be so remunerative as his private practice and, further, as the medical curriculum in India is an exceptionally prolonged one and is expensive, and must continue to be so, in order to remain efficient, there is more need for a class of enthusiastic workers to come forward from outside than from the medical profession, simply for the purpose of helping medical men by carrying out their instructions, scientifically instead of mechanically, and to adopt a career in the sphere which is pecuniarily less attractive, and which is comparatively less responsible too. Research and general workers, at least in the domain of public health, are required in large numbers all over the country, and the need could not be met under any circumstance unless we created a cheaper but efficient class from outside the medical profession. The only possible source which may be drawn upon to

provide a large number of such workers is the pharmaceutical profession closely allied to the medical profession. The bulk of valuable research work which is in evidence at the annual session of the British Pharmaceutical Conference, the scientific contributions made by pharmaceutical chemists throughout the Continent and in America, the active share taken by the profession in the revision of Pharmacopœias, the increasing importance attaching to the profession since the war, all pharmaceutical schools in the United Kingdom being now crowded, speak eloquent of the services rendered by the pharmacists in the West, and India may very well introduce a course of training which is useful both in peace and in war and which will provide *independent* employment for young men and women of all communities *first* as dispensers of the nation in urban and rural areas, *secondly*, as public health workers and analysts and, *thirdly*, as dependable and qualified assistants of superior medical practitioners. These pharmacists will constitute the cheapest, qualified, and consequently more *efficient* and *useful*, agency for carrying on sanitary measures, and for reducing the cost of medical relief, thereby bringing it within the reach of the toiling and the suffering millions of this country. The other great advantage is—and this counts more than any other argument for cheapening medical relief—that the presence of qualified pharmaceutical chemists will popularise indigenous

**Services rendered by pharmacists. Importance of pharmaceutical training.**

**Cheapest and efficient agency.**

Indian drugs on scientific methods, it being the duty of these chemists alone to study the herbs and drugs scientifically, both in the fresh and in the dried condition, and to place their active constituents in suitable forms for medicinal use. There may be medical officers here and there in India who may interest themselves in the subject, but their work in this line is generally more or less amateurish unless they are wholeheartedly assisted by qualified pharmaceutical chemists who are now very few out in this country. Considering India's great and urgent need for sanitary and medical improvements—improvements which are intimately associated with the health of the people—all well-wishers of the country must insist on the introduction here of such systematic pharmaceutical education as is understood and is in vogue in the West. Very large reforms have lately been made in pharmaceutical education at the instance of the Pharmaceutical Society of the United Kingdom, and the London University, following the lead given by the Universities at Manchester, on the Continent and in America, has instituted a regular science Degree course in Pharmacy. With limited means at its disposal the Calcutta School of Chemical Technology has struggled hard since 1919 to promote pharmaceutical education and is designed, though in a humble way, to meet this paramount need to some extent at least, not only in the domain of public health but also in agricul-

**Possible way of cheapening medical relief.**

**Pharmaceutical education at the Calcutta School of Chemical Technology.**

ture and industries. The School still stands alone and invites co-operation to be able to extend its benefits far and wide. It was the first institution in India to draw particular attention to Technology in 1919 when the subject was perhaps unheard of in this country, and to show how it could be made to reach even the poorest *ryot*. The feeble note which the School thus sounded years ago, is now being echoed and re-echoed in several Indian university centres.

## A Plea for Pharmaceutical Training in India

### Local Manufacture of Medicines.

Excise Dept. order of Nov. 1924.

It will perhaps be recorded in the Annual Excise Administration Report in due course that the orders issued by the Excise Department, Bengal, in their letter of November 29, 1924, to bring alcoholic medicinal preparations by local manufacturers in conformity with recognised standards, constituted an important departmental measure with far-reaching effects. The privilege enjoyed by the local manufacturers of medicines for obtaining spirit, either duty free or at a concession rate, is no doubt a great boon designed to stimulate local industries. So far as medicines of the British Pharmacopœia are concerned, there is a standard which must be rigorously adhered to by all manufacturers throughout the British Empire.

It is, however, extremely unfortunate that this standard is inoperative in India in the absence in this country of a regular Food and Drugs Act which obtains more or less in almost all civilised countries.

Demand for the B. P. standard in B. P. alcoholic preparations.

The recent Excise Department orders referred to, which deserve the thanks of the public, demand that the medicines turned out with spirit received at the concession rate of duty must conform to a standard which, as far as their alcoholic content is concerned, must guarantee their therapeutical value. It is further observed that, as the standard of alcoholic and drug contents in medicines included in the British Pharmacopœia is the result of long and careful observation and experience, the necessity of such medicines manufactured in Bengal conforming as far as possible to the standard prescribed in the British Pharmacopœia, is obvious.

### Standardisation.

The principle laid down in the above orders for the alcoholic and the drug content of B. P. medicines to conform to the B. P. standard, anticipates the need for legislation and for the training of pharmaceutical and analytical chemists on the lines existing in western countries. Further reasons for the adoption of these measures were afforded the other day (November 1925) by the passing of a resolution, in which the councillors



School of Chemical Technology, Calcutta, investigating crude drugs and standardising manufactures (S. C. T. Products).

of the Calcutta Corporation appeared to be alive to the harm to public health from adulterated drugs and proposed to seek the assistance of the Excise Department and of the Public Health Laboratory. A Bill to provide for pharmaceutical training was submitted to, and it is already before, the Bengal Legislative Council, it being preposterous to think of uneducated people, or of even medical or science graduates of Indian universities, to provide these trained and professional chemists without a systematic training in these specialised lines which, on the other hand, open new avenues of honourable emplyment for educated youths and girls of Indian and Anglo-Indian communities. The statistics received in June 1924 by the School of Chemical Technology, Calcutta, from the editor of the Pharmaceutical Journal, London, regarding the average annual number who are registered as apprentices for pharmaceutical training and who subsequently qualify, are very interesting in this connection. There are several thousands of pharmaceutical and analytical chemists in the United Kingdom either in independent careers or in public appointments, and during the last five years since 1919 the average number of students registered as apprentices for pharmaceutical training amounted to 2,067 annually and those who annually passed the qualifying examinations were 2,313 for the Minor and 60 for the Major qualification, respectively. The number in the United States, America,

**Pharmaceutical training indispensable.**

**Statistics of pharmaceutical training in England and America.**

are still higher, over four thousand students having joined pharmaceutical colleges during 1924. Are not these figures sufficient eye-openers and will our City Fathers, University authorities and Unemployment Committee people continue to "wait and see"?

**Need for legislation.**

It is no doubt generally admitted that legislative checks over the sale of adulterated articles of food or medicine in India are urgently needed to save an impoverished and a disease-stricken nation from further physical deterioration, and if such checks are forthcoming concurrently with measures for the evolution of the right type of trained chemists who will be able to enforce these checks, the ideals animating the School of Chemical Technology, Calcutta, in its unstinted and continuous efforts since 1919 to provide specialised courses of pharmaceutical and analytical training and to introduce statutory qualifications in these respects, are likely to be shortly realised.

### Pharmaceutical Training—a remedy for Middle Class Unemployment in India.

**Middle class unemployment. Sir Willoughby Carey's views.**

On the occasion of the annual demonstration which was held in April 1924 at the laboratories of St. Paul's College, Calcutta, in connection with the work of the School of Chemical Technology, Calcutta, in respect of chemical manufactures, commercial analyses and indigenous drugs research, there was an interesting discussion on Unemployment. Sir Willoughby Carey pointed out that there was practically no unemployment amongst the

labouring classes who were commanding much better wages now than before and that it was the educated middle classes who were the sufferers. He was aware of the extent of unemployment amongst the Anglo-Indians but could not give any figure as regards the middle class Indians. Business lines would provide new careers, but young men should not expect a fortune at once. They should rather learn to be patient. As an example he mentioned that educated and trained youths from amongst the most advanced nations would work for nothing in business houses elsewhere for years and then start their own business or accept employment on a small pay to begin with after a prolonged European training.

Self-help.

There was a free discussion on the subject and although it was held that the solution of unemployment would largely depend on self-help and on the association of manual work with general education from primary classes, Rai Sahib B. M. Gupta invited public support for efforts of self-help as shown by the School of Chemical Technology, Calcutta, and suggested the formation of a Limited Company with a strong board of directors, such as represented by Sir Willoughby Carey, Sir R. N. Mukherjee and others, who would infuse public confidence with a view to financing industries and agriculture on sound business lines. These industries on being multiplied would be large centres of new employment, thereby reducing unemployment.

Training in salesmanship and in business.

The writer, in the course of his demonstration, remarked that the selling side generally presented more difficulties than the manufacturing and proposed to have a number of young men trained in salesmanship and in business generally by a direct resort to the market.

While approving generally of the idea, Sir Willoughby Carey insisted upon the adoption of a comprehensive teaching propaganda, technical and commercial, and urged the continuance of the useful work carried on at the School Chemical Technology designed for all classes and communities.

A regular and sound pharmaceutical training forms a special feature of this School and it may be mentioned that a medical officer of H. E. H. the Nizam's Government joined the institution, with effect from November 2, 1925, to undergo a a course of instruction in the investigation and manufacture of indigenous Indian drugs.

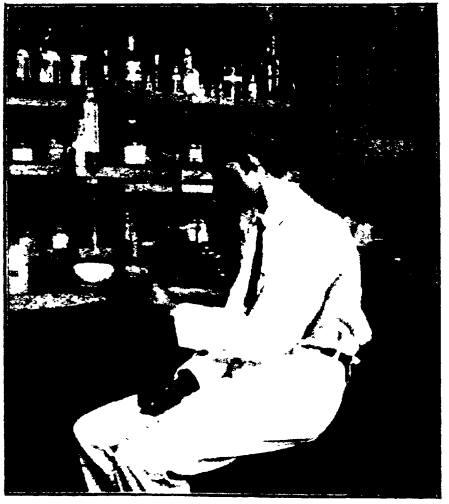
### Pharmaceutical Training and the Manufacture of Drugs in India.

Pioneer work in drugs manufacture by Government medical stores.

It is perhaps not generally known to the public that the impetus given in recent years to the local manufacture of drugs and of pharmaceutical preparations out of indigenous materials, is largely due to the initiative taken by the Government of India. The pioneer work in this direction was undertaken by the Government Medical Stores



A Corner of the Analytical Laboratory.
A Medical officer of H. E. H. the Nizam's Govt. is seen at work.



A Corner of the Manufacturing Laboratory.

SCHOOL OF CHEMICAL TECHNOLOGY, CALCUTTA.

Department which established, a few decades ago, drug manufacturing factories at different centres in India in the interests of economy and to meet the requirements of military and civil hospitals. The Madras factory which was originally a small one, was throughly re-organlsed under the able direction of Colonel Carruthers, I. M. S., and develoved into a largest drug factory in India. This factory was the chief centre of activity of the Drugs Manufacture Committee. The scarcity of drugs experienced in India and in other countries during the late war, demonstrated the folly of depending on foreign supplies for such necessaries of life as could be locally provided and, in its issue of 24th January 1916, the *Madras Mail*, in the course of a leading article on the subject, made several suggstions for a systematic effort to grow several of the vegetable drugs and to proceed with manufactures as in the case of quinine production under Government control. The desirability of substituting indigenous drugs for imported preparations was meanwhile prominently brought to notice by discussions in the Legislative Councils and otherwise, and the late Surgeon-General Sir Pardey Lukis lent to the subject the weight of his position by openly declaring that, if ill, he would rather place himself under a good *vaid* than under a bad doctor. The matter was also not overlooked by the Indian Industrial Commission, and the late Viceroy (Lord Hardinge) laid

Impetus given by the late war.

the foundation stone of the Unani College at Delhi.

*Pari passu* with the Government activities referred to for encouraging the local manufacture of imported drugs and the extended use of really useful indigenous medicines prepared by scientific methods, private enterprise was not lacking to push on both research and manufactures and in January 1919 there was established, in the heart of Calcutta, a School of Chemical Technology. This School which has been under the direction of an Advisory Board since March 1921, as a result of the public meeting presided over by the late Sir A. Choudhury, has made steady progress, offering courses of instruction in applied Chemistry, Botany and Bacteriology and undertaking pharmaceutical manufactures and research on a small scale for the purpose of demonstrating them to students. To make the institution self-supporting and to offer students opportunities for earning whilst learning—a scheme which is badly needed to help poor students and to solve the problem of unemployment—*standardised* manufactures, on a commercial scale, of British Pharmaceutical Spirits, Tinctures, etc., and of indigenous Indian drugs, namely, Allyl, Ajowan, etc., are being arranged for in the School under its founder, and having regard to the initiative and enterprise which he has shown and which has elicited admiration from several quarters both in India and England, it is

**Pharmaceutical research and manufactures at the Calcutta School of Chemical Technology.**

confidently hoped that the Institution will receive the wide support of district boards, municipalities, railway companies and other public bodies, as well as of the public, who, by their co-operation, will encourage the development of pharmaceutical education and industries in this country, and who will bring under control the widespread adulteration and frauds in foods and drugs, the vital necessaries of human life. It is also worth mentioning that a regular pharmaceutical research is proceeding at the School, the *first* paper on the use of Hydnocarpus oil for the treatment of Leprosy and several other important papers, namely, those on Allyl, Aloes, Belladonna, etc., having been published by the Institution.

### Indian Drugs and their Scientific Uses.

Calcutta Exhibition, 1923.

In opening the Calcutta Exhibition on December 1, 1923, His Excellency the Governor (Lord Lytton) said the Exhibition would afford an excellent opportunity to the trade and industries of Bengal, together with other parts of India, of showing what could be produced here. It would indicate the directions in which our products could be improved or expanded and those in which new developments or new openings are possible.

### Drug Wealth of India.

In the domain of chemical and pharmaceutical industries very useful work is being done by certain

firms whose products were on view at the Exhibition. No steps were taken by those firms, however, to show the drug wealth of India. The School of Chemical Technology, Calcutta, made an effort in this direction, and in order to demonstrate at the Exhibition what new developments and openings are possible, samples were collected from Kashmir, Darjeeling, Bengal, and South India The exhibits included herbs which are endowed by nature with valuable therapeutic properties and which open new fields for research and industrial work. It would be disastrous if our enthusiasm for finding synthetic remedies interfered with research for natural remedies in the vegetable kingdom. As examples of the popular drugs which Europe and America buy from India, aconite, ajowan, areca, cardamoms, chiretta, castor seeds, catechu, dhatura, sandalwood, senna and others too numerous to mention, are well-known.

**Drug wealth of India.**

### Scientific Developments.

**Scope for scientific work and useful employment in drug cultivation and in the supply of crude drugs.**

Drug cultivation and the supply of crude drugs are lines which are awaiting scientific developments, and as such, they constitute more lucrative but less laborious occupations than ordinary agricultural work, being not dependent on the monsoon and being entirely manageable by scientific knowledge, skill, and business honesty. The educated middle classes of all communities in India will find ample scope and congenial work in these lines provided

they undergo a course of training in Pharmacognosy, Applid Chemistry and Botany, and great developments are thereby possible, adding to the wealth of the country and rendering the British Empire self-contained in respect of all necessary drugs. If scientific cultivation, collecting, drying, curing and marketing are resorted to in respect of drugs, very large improvements are obtainable, placing better and fresher crops on the market, say, of cardamoms, and other valuable drugs, and securing several advantages. It has been ascertained that these drugs grow in the interior in the virgin forests under the shade, and the generally inaccessible character of these places, infested with wild animals, together with difficulties in labour supply, place the cultivators very much at a disadvantage with local merchants and middlemen. If manufacturing chemists and buyers abroad would interest themselves in better and uniform quality, arrangements could be made direct with plantations through the School of Chemical Technology, Calcutta, which is prepared to offer its services for stimulating the drug trade and the development of pharmaceutical industries.

### Outline of a Scheme.

**Drugs cultivation as a cottage industry.**

It is obvious that drugs cultivation and the supply of crude drugs would afford new openings which could be largely developed by the application of science, as briefly outlined in the following

scheme: It may be mentioned at the outset that industries which are possible only under capitalistic methods and organisations are not generally suited to the conditions of this country. The people need to be introduced only to such schemes as would be practicable and profitable to carry out with limited means. This may be exactly the position with drug culture and the supply of crude drugs, which are pleasant agricultural occupations, combined with science, which seem to be well adapted to the tastes of the educated middle classes, whether Anglo-Indians or Indians, and which are apparently the industries in which India may continue to maintain a pre-eminent position. It has been authoritatively pronounced on more than one occasion and lately by Professor Greenish, as reported in *The Indian and Eastern Druggist*, London, that India, in view of the remarkable variations she possesses in respect of climate, altitude and soil, should become the chief source of the Empire's drug supply.

The late Great War, which cut off supplies from Central Europe, gave an impetus to the growth and exploitation of drugs in India, and this industry should not be allowed to slip out of our hands now that a serious problem of unemployment is awaiting a solution. If one would care to look at the pages of the British Pharmacopœia, he will come across many familiar names. The very first page opens with a monograph on *Acaciæ Gummi*,

**Examples.**

which is a gummy exudation from the stem and branches of either *Acacia Senegal* or of other species of acacia known as the *babul* tree in Bengal. Not only is the gum used medicinally and otherwise, but a valuable tanning material is obtained from its bark and pods, and industrial implements made from its wood.

All the waste lands in Bengal and elsewhere may be planted at once with this tree, which grows wild, and being a leguminous plant, it may turn the waste land into fertile in a few years. Take other instances, such as *Adhatoda Vasica*, (Bakash) *Andrographis Paniculata* (Kalmegh), *Alstonia* (Chhatim), *Aurantii cortex* (orange peel), ajowan, anethi, capsicum, castor, cassia, coriander, cubebs, dhatura, fennel, figs, ginger, ground-nut, lemon, tamarind, turmeric and a host of others which may be found tabulated in nine languages under "Indigenous Drugs" in the writer's work entitled "New Chemical Industries" (Butterworth). All of these are of immense industrial value, yielding not only drugs, but in most cases food articles, dyestuffs, tanning materials or fibres, and which will bring ready money to those who would care to grow them scientifically. Small plots of land and even those lying waste in backyards may be utilised. Besides the ordinary plants mentioned, there are others which grow in the Himalayas and in South India, and all these are so largely exported to meet the world's demands that it will be astonish-

ing to know how much money there is in these lines if they are taken up in an organised and scientific fashion. They will require us not to leave our hearths and homes in pursuit of fantastic ideas, nor to invest much capital and energy, while every one will be free to follow his own ordinary vocation. The only conditions preliminary to successful results are scientific knowledge, skill and business honesty. Several industries suffer and have suffered a great deal, owing to lack of knowledge and dearth of honesty, with the result that very inferior and adulterated articles are placed on the market, prices go down, and ultimately the industry is lost.

**Essentials of success.**

**Nature of scientific training.**

The scientific knowledge required is provided by Agricultural Chemistry and Applied Botany (Materia Medica and Pharmacognosy) and a combination of these subjects is offered by the School of Chemical Technology working in association with St. Paul's College, Calcutta, the Bengal Chamber of Commerce and the City and Guilds, London.

To make the scheme a business success, a simple organization is necessary, much of the potentialities of this country lying idle or undeveloped in the absence of an organization. The organization may be threefold :—

(1) Drug Association.—This may work on co-operative lines, enlisting members in all parts of India, distributing business intelligence, preparing

statistics, communicating with the markets of the world, testing the quality of products, appraising their value and doing ordinary banking work in regard to payments.

Organisation necessary.

(2) Pharmaceutical Association—An All-India Pharmaceutical Association as in any other civilised country is necessary not only for the spread of pharmaceutical knowledge, but to maintain and enforce a standard in regard to all foods and drugs, to co-operate with the Public Health Department, and to provide the Drug Association and its members with expert advice.

(3) Manufacturers' Association.—All chemical and pharmaceutical manufacturers may form themselves into an Association for the disposal of their products under the best market conditions to the mutual advantage of the consumer and the producer. This will result in the steady development of the associated industries, both as regards their output and quality and in the maintenance of a high standard and reputation in all dealings with the world's markets.

### Need for Enthusiasm.

Lack of enthusiasm.

Although the writer was able to detail his scheme and ideas long ago and to give publicity to them through the favour shown to him by several leading papers, the *Statesman* having published the scheme in its editorial page of December 15, 1923 and subsequent issues, no public enthusiasm

beyond a number of enquiries manifested itself. The scheme is chiefly an agricultural one and pertains to scientific agriculture. If a plain statement of a case through the medium of leading newspapers and scientific journals, does not arouse enthusiasm, it is not understood how a Royal Commission on Agriculture will infuse enthusiasm in the line if the spirit is sadly lacking in the country and unless State aid is provided. Scientific cultivation of drugs does not generally involve the trouble implied by agricultural occupations Further, there is more of scientific work, such as research and its application, than of manual labour in drug cultivation, and until these facts are impressed on the people, preferably by a regular and subsidised propaganda, no enthusiasm is likely to be *ordinarily* roused.

### Indigenous Drugs.

The last War, however, emphasised the great need for paying increased attention to the cultivation of drugs in India and sometimes there were signs of a rapid extension of this branch of agriculture. Those who have studied the question have no doubts about the possibilities of indigenous drug culture.

**Possibilities.** In the Government cinchona plantations the possibilities have been practically shown and Major Gage, I. M. S., late Director of Botanical Gardens, advised the Indian Industrial Commission that, "given the necessary staff and equipment, it should be feasible

to undertake the systematic cultivation of any of all these chief species and the improvement, where desirable, of the quantity and quality of the yield."

There are innumerable drugs in India, but up to now there has been no regular cultivation of indigenous drugs, and even those grown successfully are not collected at the proper season and according to strict procedure. There are some firms which have made a beginning, and in the areas directly under their charge, success has attended their efforts. But for the most part the only organised cultivation of drugs is carried on in the gardens under Government supervision. This may be quite natural in such a conservative country as India,—but the Government cannot ordinarily be expected to do much more than carry on experimental gardens, the duty resting with the public to take up the matter and to invest sufficient sums of money in the industry.

Organised cultivation.

It was pointed out in the writer's pamphlet on "Indigenous Indian Drugs", published in 1919 by Butterworth that practically all drugs found in the British Pharmacopœia could be grown in India, and that more than 50 per cent. of them are indigenous to India. It may be mentioned that India possesses a very rich flora containing many plants which have been utilised and are still being used for medicinal purposes. Some people hold that many of these have been employed more from traditional choice than from an actual

Indigenous Indian Drugs in use in B. P.

Rich Indian flora.

scientific demonstration of their virtues. The fact may perhaps be otherwise. Owing to the vicissitudes through which India has passed and having regard to the antiquity of her civilisation, it is quite possible that the scientific work which lay behind the medicinal use of these plants, has been lost as may have apparently been the case with regard to most of the truths in respect to plant life, which were known to ancient India, and which are now being re-discovered by Sir J. C. Bose. Similarly we may proceed with the research as to the therapeutical value of reputed medicinal plants and the lines on which this research should be carried on may be as follows *First* there are drugs to be tested, which are of established medicinal value in western medicine and which are in use in the pharmacopœias of different countries. A large number of these grow wild in great abundance in many parts of India and some are even cultivated. There are numerous examples, but a few will suffice. Atropa Belladonna (Angur-i-shefa), *vide* pp. 20-21 of the writer's booklet on "Indigenous Indian Drugs" (Butterworth), grows in abundance in the Himalayan ranges (Kashmir) at an altitude of 6000 to 12000 feet. Strychnos Nux-vomica (*Kuchila*), one of the most commonly-used drugs, grows everywhere throughout the tropical parts of India. Glycyrrhiza glabra (*Mulatthi* or *Jesthimadhu*) and Citrullus Colocynthis (*Indrayan* or *Makal*) grow in North Western India. Aconite (*Katbish*), Juniper,

**Indian drugs of established medicinal value.**

Digitalis and Squill grow in the Himalayas. Most of these have been tested and found to be as good or even better than the drugs in use.

### Potent Herbs.

Search for potent drugs.

*Secondly*, it may be considered whether there are drugs which contain the same active principles as those we now use. Thus Artemesia Maritima (*Titwan*) grows abundantly in Kashmir and contains the expensive santonin as its active principle. Already a good deal of work in this connection has been done by Professor Greenish and by Dr. Simonsen. It is also understood that a factory for extraction of santonin on a commercial scale was started at Kashmir. Probably there are other herbs just as potent which have never come to light and these may be without the drawbacks which some of our present drugs possess.

Work at the Calcutta School of Tropical Medicine.

At the Calcutta School of Tropical Medicine, it has been proved by Major Chopra and his colleagues that Boerhaavia diffusa (*Punarnava*), which was used both for lung and kidney diseases, is no good in the former condition, but has a very valuable diuretic action in certain cases of dropsy. Similarly at the School of Chemical Technology, Calcutta, Allium Sativum (*garlic*) and Allium Cepa (*onion*) were subjected to tests since 1919 and the results thereof published in 1922 and 1925 as to their specific expectorant action. The drug has also the

**Work at the School of Chemical Technology, Calcutta.**

bactericidal effect as well as the readiness with which its active principle,namely, volatile oil, is excreted through the lungs, thereby proving its usefulness in infective diseases of the respiratory system, such as Pneumonia, pulmonary tuberculosis, etc. It is by such careful and systematic work, by testing the action of the drug first in the laboratory where its actions can be seen on the various tissues of the body, and then by actual clinical work, the action of the drug is proved on the patient.

**Economy in the substitution of selected Indian drugs for imported articles of similar action.**

*Thirdly*, we can economise by substituting drugs which, though not exactly the same , have similar properties and action resembling those of the imported and often expensive remedies. Picrorhiza kurrooa (*katki*) of which several species grow in the Himalayas, and Picrasma Quassioides are as good bitters as the imported articles Gentian and Quassia, respectivaly. Ipomœa Hedracea (*Kaladana*) and Ipomœa Turpethum, (*Tribrit*). the Indian jalap, are as active as the ordinary jalap used.

### Crude Drugs.

**Preference of crude drugs to purified forms in certain cases.**

Several species of plants yielding good peppermint oil grow in the temperate Himalayas and on Nilgiris. Many fresh plants may be used as greens instead of the expensive active principles obtained from them. This is a matter of moment in India, as many of the inhabitants are so poor that they cannot afford to buy the common drugs such as quinine, castor oil and Epsom salts. In western

medicine there is a tendency to utilize only the active principles and for this the taking of the drug through various stages of purification increases the additional cost. Major MacGilchrist and Major Acton have shown that the total alkaloids from cinchona bark (cinchona febrifuge) are more efficient than the purified but costly quinine. This reduces the cost of treatment to less than half.

Need for more scientific investigations.

*Fourthly*, there is a vast field for investigation in respect of the drugs which are of known value in *Ayurvedic*, *Unani* and other indigenous systems, but which are not yet used by the western systems. In all the rich foliage of India and amongst those herbs used by the leading *kabirajs* and *hakims*, there must be many new preparations, which are at present not more widely known. Major Chopra's work has made this clear in the use of *Punarnava* by his pharmacological and clinical tests. There are two varieties of *Punarnava*, namely, the *red* and the *white*, and the latter only (*Swet Punarnava*, Trianthema monogyna, *vide* Sir P. C. Ray's "Hindu Chemistry", p. 267, Vol. II.), is of therapeutic value. This was long known in India and modern scientific investigations afford the verification needed.

### Cheap Treatment.

Need for cheap but qualified medical practitioners.

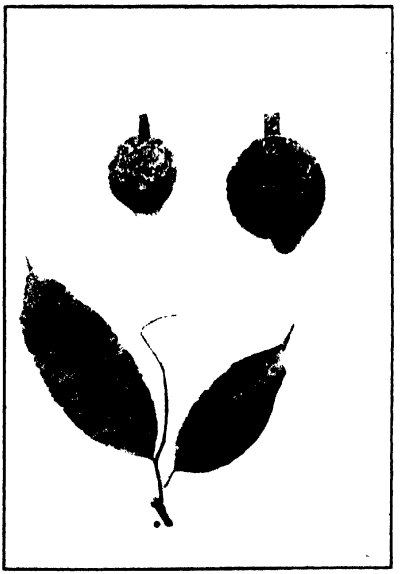
The action of drugs can be tested scientifically and exactly only when their active principles have been extracted. This involves laborious work and the results take a considerable time. When once

this exact knowledge has been obtained, the use of crude drugs happens to be the key-note of cheapness and will have to be employed among our population for many years to come. At present the aim of superior training in Medical Colleges seems to be to turn out specialists with academic degrees who require Rs. 8 to Rs. 32 a visit and who prescribe treatment equally expensive. What the *ryot* requires is a qualified practitioner who is willing to treat him for eight annas and for the treatment to cost two annas.

### Pharmaceutical Chemists.

Co-operation of pharmaceutical chemists essential.

Indian pharmacology has a great future before it and the Indian population should welcome the way that has now been shown by the work which is being carried on at the Calcutta School of Tropical Medicine on a magnificent scale, but almost *incognito* and on a humble scale at the School of Chemical Technology, Calcutta. No better example can be given than the discovery and application of the ethyl esters of hydnocarpic acid, the active principle of chaulmoogra oil, by Sir Leonard Rogers, which has now produced beneficial results in the treatment of leprosy. It may, however, be mentioned that apparently before Sir Leonard adopted this treatment, the use of hydnocarpus oil for leprosy treatment in preference to other varieties of chaulmoogra, and the real efficacy of hydnocarpic or chaulmoogric acid as opposed to gynocardic, had been shown in



Hydnocarpus Wightiana from Malabar. Seeds and Oil thereof first exhibited by the writer at the Madras Exhibition, 1917, as real *Chaulmoogra* efficacious in Leprosy treatment.

the writer's pamphlet on "Chaulmoogra Oil" published in 1917. The writer also tried to prove that the hydnocarpus oil itself instead of its ester and that combination with the active principle of catechu would be more effective in leprosy. There is ample room for further researches to be carried on as shown in the pamphlet referred to and it remains for an institution like that of Tropical Medicine with splendid facilities to push on these researches. The scientific examination of drugs is a laborious process in which the chemist plays as important a part as the medical man. At present this has not been realized by the Medical profession in India and, consequently, little provision has been made for them in research schemes. A larger staff of pharmaceutical chemists and a wider co-operation of these trained men, as explained elsewhere in this Chapter, are, therefore, needed if any rapid advance is to bo made and the work to be carried on at the same standard of efficiency as in other countries. There are many rich and patriotic Indians who, if they were aware of the value of work in connection with indigenous drugs, would help to make India self-supporing so far as drugs are concerned. It is by work of this type that we hope to see some day established an Indian pharmacopœia depending mainly upon indigenous sources of supply formulated and adapted to the special requirements of this country and bringing medicine and the healing art within the means and resources of the masses of India.

## Drug Cultivation.

Turning next to the question of scientific cultivation of drugs, we find that the cultivation of cinchona for quinine is a well-known example of drug culture, an industry which affords a great opportunity for those interested in the subject. The importance of this line and its scientific value were first brought to notice in the writer's booklet already referred to and was widely appreciated as evinced in the editorial reviews published in February to March 1919 in the *Lancet*, the *Indian Medical Gazette*, the *Statesman* and even in *American Medical Journals*. That the supply of quinine is not at all equal to the demand, was made clear during the past few years, which have seen a great increase in price. Not only is it cultivated on theNilgiris, but in several other parts of India valuable supplies are yearly available. The importance of quinine to this fever-stricken country cannot be challenged. Then, Belladonna, a typical example of an important group of anodynes, grows well in the Western Himalayas, from Simla to Kashmir, the plant yielding about 0.4 per cent. of alkaloids *hyoscyamine* and *atropine*. Belladonna is also being grown in the Darjeelling area and a supply giving the same amount of alkaloidal content was obtained by the writer from the Mungpoo garden. Digitalis is acclimatised on the Nilgiris, where it grows with little attention, while experiments are

**Striking examples of lucrative business in drug culture.**

being conducted in the Botanic gardens, Calcutta, with a view to developing the supply. Ipecacuanha has been raised with some success in the various hill stations of India, and it has been proved that it only requires care and attention to raise it in sufficient amount to make it commercially remunerative.

*Emetine* which is one of the alkaloids of ipecacuanha, a small plant belonging to the same N. O. *Rubiaceæ* that yields *quinine*, is practically a specific for amœbic dysentery, a disease very common in this country. The value of this drug is being increasingly realised and a large supply ought to be available for use. It is some forty years ago since this plant was introduced into India, but since that time under the care of the manager of the cinchona plantation in Darjeeling district, it has already developed, it being estimated there are now over one hundred thousand plants in that plantation alone. It is expected that it will soon be possible to manufacture *emetine* on a commercial scale.

**Need for an extended Survey.**

**Ample room for private enterprise *cum* scientific training.**

It will first be necessary to carry out a more extended survey of the possibilities of drug cultivation in India. The Government may perhaps be expected to give very liberal assistance to such work, but it is imperative that private individuals (including Zamindars and States), or companies

should show their readiness to co-operate. When the field is surveyed, it will be possible to take steps towards the proper measures for bringing the drugs up to the standard demanded by Pharmacopœias. It is here where failure is very apparent in the present trade in drugs. The variation in the quality of wild-grown drugs is a serious drawback to finding a profitable market therefor. For instance, Podophyllum Emodi, a plant discovered more than thirty years ago in India, though identical with the American drug used for medicinal purposes, remained unrecognised till 1914 by the British Pharmacopœia for the simple reason of variation in active constituents.

**Systematic cultivation needed.**

In the matter of climate and environments, the greatest trouble and care must be taken. At the present time the drugs are simply placed on the market and brought up by dealers without submitting them to any tests. They do not know the age of the drugs, or whether they preserve their medicinal properties. It is easy to see that there will be little prospect of advocates of western medicine taking kindly to Indian-grown drugs if the cultivation and preparation are not carried on systematically and according to acknowledged standards under the supervision of men who have undergone a thorough training in pharmaceutical chemistry and pharmaceutical botany.

There is a market, but it is necessary so to organise it that the products may not be run to

waste for lack of customers at the right time and place. Here is a field for Indian capital and for the application of scientific knowledge, and the matter is one that needs to be opened up for the sake of the people. This is true not only of Indian drugs and their scientific uses, but practically of all human pursuits wherein the application of science, and of knowledge generally, with effect—and not the ornamental holding of university degrees—is a desideratum. It is hardly possible for a pharmaceutical chemist to be only theoretical in his training, there being a large amount of practical work in his qualification in Pharmacology, Pharmacognosy and Analytical Chemistry. These subjects are entirely practical and efficiency therein differentiates a pharmaceutical chemist from a general chemist, a B. Sc., D. Sc., or Ph. D., in theoretical science as opposed to applied science. It is the pharmaceutical chemist's ability to apply his knowledge to practical work of economic value and to medical relief, which enhances his usefulness and which places him on a level with any other *technical* and *industrial* chemist indispensable for a country's progress. It is worth remembering that an ounce of practical work is more precious than a pound of theoretical knowledge and that the startling discoveries of theoretical principles, whether by Sir J. C. Bose or others, would remain ignored sooner or later if they failed to be applied to practical uses, preferably to the development of industries.

**Application of scientific knowledge and its value.**

## CHAPTER V.

### Science and Industry

#### National Wealth How Created

One of the great problems which confront statesmen and economists at the present moment all the world over, is how to end unemployment. Although the question is one and the same everywhere, its character, and its causes in particular, differ under local conditions. One feature, however, is generally noticeable throughout. The index of a country's wealth is the surplus of its production over its total consumption or, in other words, the excess of exports over imports is an indication of wealth, and a nation becomes a creditor or a debtor according as her trade balance is a favourable or an adverse one. In India we may try not to remain as a debtor nation in the economic balance, but to swing back to the credit side by (*a*) reducing our consumption and (*b*) increasing our production, agricultural and industrial. The *Khadi* movement appears to be a national effort, purely economic, and falling under both (*a*) and (*b*), and in order that it may remain devoid of any other aspect, we should not confine our attention to *Khadi* alone, but persistently and consistently see what other openings are available to develop our agriculture and industries, especially by the

**Index of a country's wealth.**

**Khaddar.**

application of science. This procedure will accelerate our progress and maintain our position on the credit side, thereby avoiding unemployment and all the evils arising therefrom.

### Impetus to Industry through Education in England.

The kind of stock-taking referred to is rendered inevitable in the course of the progress of all nations. In the United Kingdom there was a supreme national effort when, after the Great Exhibition of 1851, measures were inaugurated, chiefly at the instance of the late Prince Consort, for the establishment of a Department of Science and Art under the Committee of Council on Education. The action taken called forth a new spirit, and gradually awoke a more intense desire, with a view to increasing England's industrial efficiency, for a better understanding of science and art in their application to manufactures and commerce. This was manifest in the great Educational enactment of 1870, followed by a Royal Commission of Enquiry about 1880, the Technical Instruction Act of 1889, and the further Act of 1890, which placed at the disposal of the local authorities in the United Kingdom an Imperial grant of nearly £800,000 a year in aid of the Act for the promotion of Technical Instruction. In the meantime a system of technological examinations had already been founded by the City and Guilds of London Institute, and help was offered for the

**Educational enactment of 1870.**

Promotion of Technological education.

establishment of courses of instruction, and amongst the first of the Institutions to avail itself of the opportunity thus given was the Manchester Mechanics' Institution which was founded in 1824 and which, through a succession of changes including the transfer of the Institution to the Corporation of Manchester in 1892, was eventually transformed in May 1900 into "The Municipal School of Technology, Manchester." In opening the new buildings for the School at Sackville Street in October 1902, the Prime Minister, The Right Hon'ble A. J. (now Lord) Balfour, spoke of the School as "the greatest fruit of its kind, the greatest fruit of municipal enterprise in the country."

Municipal School of Technology, Manchester.

### Same remedy applicable to India.

Secret of success.

The above brief retrospect of what was done in England convincingly shows that the secret of England's industrial and commercial success lies in revising in time her educational system and in recognising that successful industrial and commercial competition, and a high standard of manufacturing production, depend much more upon the adequate training of the leaders and managers of industries and commerce than upon that of the workmen who nevertheless require the most careful provision and earnest encouragement.

It is no doubt the first duty of Municipalities and District Boards in India to provide free pri-

mary education in the interests of the workmen, also efficient technical education and training for their respective occupations according to their means and opportunities. But it is equally essential, if not more, that efficient secondary and technical education should be simultaneously provided to train those who are destined to be the future leaders of labour and who really constitute the industrial brain of the nation. As explained in preceding chapters on "Technological Education", and elsewhere under "Science and the Bread Problem in India", there has been a criminal neglect of opportunities for applying science to the development of agriculture, sanitation, and suitable industries which are supremely required in India. We have suffered much, indeed we are almost brought on the verge of ruin, as aleady noticed in Chapters II and III, from a false conception of education which has allowed literary and unproductive education to prevail in the country to the exclusion of almost all avenues of employment except a few dependent on literary qualifications. This suicidal action is only parallel to that of leaving a large theatre packed with people with one door of exit when the whole stage is in flames. The remedy is quite simple. Open out the doors of exit and thousands of lives will be saved. Starvation will be brought under control and the country will prosper.

**Action called for in India.**

**Unproductive education, a suicidal blunder.**

### Practical suggestions.

Remedies.

It rests with us all to do our little mite, and by co-operation and co-ordination we may set up a huge structure, sufficient perhaps to meet most of our immediate needs, when, having regard to financial stringency everywhere, we may not expect the Government to provide £800,000 a year as was done in England, or the Calcutta Municipality to be as forward as the Corporation of Manchester. We may feel proud of the public spirit displayed by the Tatas in the establishment of the Bangalore Institute of Science and we are bound to show our national gratitude to the American millionaire (already referred to in Chapter IV, p. 51), who so generously provided the money, also to the Government of India who took further necessary action, for the creation of the Imperial Agricultural Research Institute at Pusa. Several such Institutions may spring up in future, preferably through private enterprise. The technological subjects are so varied and the scope so vast that there is enough room for a number of public—spirited people to co-operate and to formulate their own curriculum according to the programme they propose to pursue. Keeping agriculture in forefront and sanitation and manufacturing industries next in order of urgency, a very largely extended curriculum compatible with modest means may be framed. As an illustration of what could be done with limited resources and co-operation, it may be

mentioned that the School of Chemical Technology, Calcutta, with the generous co-operation of St. Paul's College, provides a number of specialised courses of instruction as under :—

Technological instruction.

(1) Scientific agriculture (analysis of soils and manures ; microscopical examination of seeds, fibres and plant diseases ; study of plant food, inorganic and organic).

(2) Scientific cultivation of drugs and exploitation of forest and other agricultural products by application of Pharmaceutical Chemistry, Botany and Bacteriology.

(3) Scientific utilisation of tanstuffs ; estimation and extraction of tannin ; preparation of vegetable tannage for Leather Tanning.

(4) Development of public health and prevention of diseases by analysis of waters, foods, drugs and disinfectants.

(5) Bacteriological and microscopical examination of blood, sputum, urine, as first aid to medical relief and public health work.

(6) Development of commerce and of mining industries by analysis of ores, coal, shellac and other industrial products.

(7) Soap chemistry and manufacture of pure soap, both toilet and washing, free of all animal fats.

(8) Investigation and manufacture of all indigenous herbs and drugs, such as belladonna, cinchona, nux-vomica and such other useful medicinal products.

**Duplication avoidable by a Technological Board.**

**Nation-building work.**

It is obvious that the courses specified are closely associated with the subjects which are popularly known as pertaining to nation-building work and wherein Indian resources and Indian talents of all classes may be fully utilised. The Calcutta University College of Science and Technology is for higher research in pure and applied science. According to the principles enunciated elsewhere (p. 42) and, particularly, in the article on "Science and the Bread Problem in India," the pupils intended for higher university careers should preferably be people of large means and of marked ability unless we desire to aggravate the present situation due to unemployment and consequent poverty. A practical educational scheme is expected to educate scientifically even the *ryot* who tills the soil, as already pointed out in Chapter I, p. 18. He requires to be taught, in his own vernacular and through his own common sense, how to apply science to the development of agriculture, sanitation, and industries, and not to write thesis. There is already an overlapping of activities by having too many institutions to do either (a) mechanical work or (b) highly theoretical work, amounting to an unpardonable waste of public and private money. We cannot afford to be charged with the indictment that "while Rome is burning, Nero is fiddling." Let us strike the middle course with all our might and assign to

**A practical educational scheme.**

each class from the highest to the lowest the line of education suited to it from the broadest standpoint of "greatest good for the greatest number," to which we have already referred, p. 57, scrupulously avoiding wasteful expenditure and refraining from putting round things in square holes as is often the case in mundane affairs. We may create a Board of Technological Studies at once with the co-operation of all technical and technological institutions in the country and take wise counsels therefrom, thereby setting our house in order before it is too late to do so.

Board of Technological Studies.

### Indian Exhibits at Wembley.

The last British Empire Exhibition at Wembley offered a unique opportunity for India to take such steps as could indicate her determination to advance industrially, not by the rule of thumb method as is in evidence in her antiquated crafts and wares, but by the application of science which is being insisted on throughout this volume. Large hopes were entertained about the advantages that would accrue to India from her participation in the Empire Exhibition. Both in the Council meeting which voted for the participation of Bengal in the British Empire Exhibition and in H. E. the Governor's speech on the occasion of opening the Calcutta Exhibition, it was stated that the Exhibition would largely assist in promoting the industrial development, and consequently the economic

**Meaning of industrial development.**

condition, of India. There is no doubt that industrial lines are numerous, even the humble industry of bidi-making being not excluded from the scope. But when the industrial development of a country is mentioned, it generally refers to such industries as are intended for the welfare of the masses, and not particularly to those which are designed to encourage the drawing-room decorations of the rich. Acting on this wider view of industrial development one would be entirely mistaken in his efforts and wasteful in his expenditure if he organised a mere show to draw out, from nooks and corners of districts, such articles as would suitably find a place amongst the paraphernalia of a drawing-room only, and left out such industries as really meant wealth and comfort to the people. We now know that Wembley presented a unique spectacle, exhibiting not only the wealth and beauty but also the vast resources of the Empire and that the effect thereof surpasses what is conceived and counted by mere francs and dollars.

**Chief industries of Bengal and Bihar.**

It is generally known that India's industries chiefly consist of wheat, rice, jute, coal and tea. The silk industry of Bengal has lost the glorious position which it occupied. The lac industry is a promising one, and requires to be scientifically developed, steps to this effect having already been taken by the Industries Department. As Bihar and Bengal are contiguous, mica, iron and steel may also be mentioned here. In fact jute, lac and mica

cover the whole ground in which the world's demands are entirely met from India. It was, therefore, natural to expect all industrial possibilities and improvements in connection with these and other items of economic value to have been largely represented before the world's eyes which were attracted by the late British Empire Exhibition. Thanks to the ceaseless care and industry of the organisers, no pains were spared to carry out this object, as it would have been suicidal and an unwarrantable waste of public money if, instead of these chief industries which are meant for the world trade, we simply exhibited conch-shells, mats, carpets and similar other articles.

We know that India is culpably misrepresented when Indian industries at present are typified by haggard looking labourers squatting on the floor, smoking hookkas and lazily plying their crude implements to produce some sort of handicraft for which the world at large does not care a bit, although the product and its scenery may be amusing for the time being. Besides the raw products mentioned, manufacturing industries are slowly making their headway in the face of innumerable difficulties. At the Calcutta Exhibition there were more than half a dozen stalls of Indian matches which were sure indications that in spite of repeated failures, the match industry had come to stay. It was also very hopeful to come across such local industries as those of rubber goods and

**Indian match industry.**

**Textile and other industries.**

tyres; textiles and papers; waterproof fabrics and soaps; chemicals, drugs and minerals, such as were exhibited in the stall of the School of Chemical Technology, Calcutta, which endeavours to train the young men and women of India in such useful handicrafts and technical pursuits by directly applying science thereto.

If industrial development means anything, the industries which contribute to the well-being of millions are readily thought of. If so, it is most ridiculous to think of jewels, antiques and curios from the heirlooms of a Maharaja as representatives of industrial development when unemployment and poverty are reported to be rampant in the country. But in an Empire Exhibition all sides must be represented, exhibits of wealth and beauty being as necessary as other exhibits. In several quarters it is usual for a Hindu to be represented by a snake-charmer or a darwan, and for India by dancing girls and sweetmeat manufacturers. We should have simply repeated the same suicidal mistake had we allowed India's industries and progress to be represented by time-worn clay models, horns, mats and even muslins while much more useful exhibits came from other parts of the Empire. It was, therefore, respectfully suggested in time through the columns of the *Statesman* that exhibits, if any, which were worthless from an industrial point of view, should be recalled in the interests of India's dignity in the comity of nations.

**Possibilities for India to be misrepresented.**

There is, however, a great point of artistic beauty and superior workmanship in India's arts and crafts, and as such they speak eloquently of India's culture and civilisation. The other redeeming features of Indian exhibits for the Empire Exhibition were the inclusion therein of forest and agricultural products, of tanstuffs and leather goods from India.

Importance of India's forest products, etc.

Both in the opinion of Sir William Vincent, Controller of the Indian Section at the Wembley Exhibition, and of Sir Atul Chatterjee, the High Commissioner for India, the most attention which India apparently received at the Exhibition was chiefly in respect of her wonderful arts and crafts which are referred to above and which will no doubt open some new lines of business to India's advantage. It is beyond argument that India's resources should be developed by all means, not alone by concerting every effort and energy on the production of such goods as could be made with the least outlay of capital, labour and skill, but also by directing this effort in a scientific way, so that we may produce what is *cheapest and best* and what contributes to the welfare of the world as a whole instead of to the limited requirements of particular classes. Wembley, however, has achieved a great success—the success of impressing a new conception of Empire upon millions of people—an Empire which is as united in peace and prosperity as in adversity

India's resources how to be developed.

Success of Wembley.

and war-time. This is worth all the expense that has been incurred and all the attention that has been devoted to the Exhibition.

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## CHAPTER VI.

### Prospects of Chemical Technology

#### Technological Chemistry.

Technology from a chemical point of view has been dealt with to some extent in preceding Chapters III & IV, and after all has been said and written on the subject, it is still hardly possible to do justice to it within the scope of this volume, the subject being so vast and extensive. In fact we are touching only the fringe of the whole subject.

Scope of Applied Chemistry.

What we want above all is to train young men and women to technological chemistry so that they may take advantage of the many opportunities existing in the country, but at present neglected, to develop chemical industries. As, however, we know, most have not that enterprise and the question with intending students is what services they will be able to find and what salaries will be given to them. Taking Messrs. Balmer Lawrie as typical, that firm employs several chemists on salaries of Rs. 150 a month and upwards. The whole ten-

dency of the day of course is to employ more and more technicists; mills of every kind now find it necessary to have on their staff somebody with a practical knowledge of chemistry. In the manufacturing line it is indispensable. The student, therefore, if he will take the trouble to make personal enquiries, will get information from these firms as to the kind of openings that will be likely to be available for him and the pay he would receive; though one can hardly insist too much that the best rewards will come to those who do not seek service but seek to strike out a line of their own for which there are such abundant opportunities. The scope of Applied Chemistry is very great. The School of Chemical Technology, Calcutta, is able to offer only a few specialised courses for the present, as detailed in Chapter V, pp. 102-103, and the pupils who undergo a course of instruction at the School, have the following prospects open to them :—

**Courses offered by the School of Chemical Technology and their prospects.**

## Prospects

### (i) Pharmaceutical Training.

Broadly speaking there are three main aspects of *Pharmacy*, namely, (1) Dispensing. (2) Analysis, (3) Manufacture. In India the position as regards (1) of pharmaceutical training is now quite unsatisfactory, but it will have to be changed in the public interest. In chemical factories experienced compounders who are called Chemists' Assistants

are allowed up to Rs. 100 a month. These compounders are of poor education and it is very likely that their class will shortly be superseded by men of better pharmaceutical education as is in force in all civilised countries where a qualified man employed in dispensing is generally paid at about £4 a week corresponding to Rs. 240 a month. In several European Chemists' shops in this country a few qualified dispensers are entertained on equal terms as those coming from England. Such terms will no doubt be available for Indian students as soon as the practice of Pharmacy in this country is placed on a proper footing either by the introduction into India of a Pharmacy Law as contemplated in the Food and Drugs Bill already referred to in p. 73, or by sheer weight of public opinion in the interests of public health. Prospects of employment apart, Pharmaceutical Chemists in Western countries command respectable positions either as (a) Analysts for whom there is a growing demand in India, or as (b) Manufacturers, these two professions being the second and third departments, respectively, of Pharmacy as already mentioned.

**Pharmaceutical Chemistry including Botany and Bacteriology.**

In Industrial Chemistry analyses and manufacture go hand in hand as explained in Ghosh's "New Chemical Industries" published by Messrs Butterworth & Co., Calcutta. As illustrations of the commercial possibilities of "Pharmaceutical Chemistry" numerous suggestions will be found

in the book. Briefly, it may be said there are thousands of possibilities provided a thorough industrial training, enterprise and capital are combined. Taking the pharmaceutical manufactures alphabetically, they may be made, not as inferior preparations which generally flood the markets here, but as genuine and *standardised* articles for use in cases of :—

(1) *Accidents and emergencies, e.g*, poisoning cases, burns, bites, cuts, wounds and injuries, aches, gripes and cholera. In a country where the large majority of people are illiterate and where medical help is not readily available, antidotes which are generally applications of the knowledge of Chemistry or Bacteriology, are invaluable in the saving of human life.

(2) *Agriculture.* There is need of fertilisers, killers of weeds, plant diseases, pests, etc. Scientific Agriculture.

(3) *Beverages.* In a hot country where stimulants are generally injurious to health, there is scope for doing useful work of a commercial value by an intelligent application of industrial chemistry.

(4) *Cements* (not Portland Cement which is a separate industry altogether unconnected with "pharmaceutical chemistry"). There is a need for the manufacture of Glues, Pastes, Mucilages, etc.

(5) *Confectionery and Chewing Gums.* Preparations of chocolates by the utilisation of certain bye-products in oil industry, of lozenges and of con-

centrated chewing gums are instances of commercial value.

(6) *Insecticides* include such as are used for the destruction or expulsion of fleas, bugs, and other such insects that infest the land.

(7) *Lubricants* embrace those used for vehicles, motors, machines, various kinds of apparatus, such as air pumps, stopcocks, etc.

Drugs Manufacture.

(8) *Medicines* have a large field, for instance, concentrated or liquid extracts, tinctures, liquors, aquas, confections, effervescents, powders, pills, syrups, tablets, and lastly heavy and fine chemicals; each of these preparations invariably requires a highly technical knowledge of Botany and Chemistry for conscientious work, though not necessarily much capital in each case.

(9) *Paints and Varnishes* are of various colours and for various purposes, such as for painting woodwork, metals, pottery, toys, etc, both painting and varnishing requiring a knowledge of the chemical nature of the pigments used, also skill in mixing and boiling.

(10) *Preserving and Canning.* In agricultural countries, *e. g*, United States and Australia, very large industries in connection with Preserving and Canning have been built up by the application of the knowledge of Bacteriology and Chemistry. In India which is no less an agricultural country and which produces enormous quantities of fruit, grain, and vegetables, also of animal products, such as

milk, meat, furs, skins and feather, similar industries, either on a small or a large scale, could be established if Indian students and capitalists were scientifically inclined.

Examples of cottage industry.

(11) *Starches*, such as those obtained from rice, wheat, maize, sago, potato, sweet-potato, arrowroot, tapioca, rye, barley, oat, beans, nuts, *singhara*, *cholam*, *ragi* and from numerous other cereals, etc., which in many cases grow wild in this country or are readily cultivable. These starches are, in several instances, more nutritious than ordinary foodstuffs and will feed millions of people if only attended to in a scientific and business-like manner. With scientific manipulation they will also make valuable food articles of the class known as Mellin's Food, Benger's Food, etc.

(12) *Toilet preparations and Perfumes.*—Hair creams, face creams, toilet powders, pomades, perfumed hair oils, essential oils, etc, are largely in use and are necessary accompaniments of civilisation so much so that they may be called the necessaries of life. Most of them may be undertaken as small or cottage industries, home and female labour being largely employed ; the success depending on a sound technical knowledge of Chemistry.

Various applications of Pharmaceutical chemistry.

(13) *Waterproofing.* Various chemicals are used in waterproofing linen, canvas, leather, paper, pasteboard, cotton goods, oil-cloth, etc. The right way for tackling these industrial subjects under any of these heads is not to try to get hold of a formula

somehow, a method to which there are several objections, but to study the chemistry underlying these industries and to gain a knowledge that may stand any competition or difficulties that may arise in the course of industrial work. The commercial possibilities of waterproofing are very great as evidenced by the demand, particularly during the rainy season. Waterproofing also enhances the durability or the life of an article and, is therefore, in demand throughout the year. It is reported that about 10 crores of rupees worth of waterproofed materials are annually imported into India. A well-trained man with his presence of mind may accomplish with a small capital what would otherwise not be possible with a comparatively large capital.

(14) *Writing materials*, such as inks, marking inks, copying inks, carbon papers, etc. There are already so many preparations in the market that there is hardly any chance for a new preparation to be successful unless it is cheaper in price and better in quality. It is a matter of superior scientific knowledge to produce a product of the kind required. As the initial outlay involved in each case is small, Indian students should apply themselves to any of these small industries and undergo the necessary training by attending short courses.

Wide range.

It is not proposed to attempt giving an encyclopædia of information in such a brief memorandum. The illustrations given represent a few

typical cases of application of Pharmaceutical Chemistry and will, it is hoped, suffice to show the very wide range of the subject and the desirability of confining one's attention to a limited portion only after a general knowledge has been acquired. A very useful supplement to this knowledge is to obtain some factory experience and students would do well to co-operate, each contributing Rs. 10 only, and to enjoy the benefits of co-operative work which is referred to later on under *Course* V (Manufacture of Indigenous Drugs, including Scientific Cultivation).

### (ii) Manufacture of Soap.

Chemistry of Soap and Oil.

Soap is an article of everyday use and is essential in the interests of health. There is a large and a growing demand for soap. This demand will grow further still if existing ignorance as to the ingredients of soap is replaced by chemical knowledge. In orthodox families it is still strongly believed that soap is invariably made with tallow which is obnoxious to Hindus. It is true that fat is necessary, but vegetable fat, *i.e.* oil, which is often cheaper than animal fat, is largely used in soap-making and India being exceedingly rich with oil-producing raw materials, the chemistry of soap and oil offers a very large scope for Indian students and capitalists. The success in soap-making depends largely on the knowledge of the oil to be used. Moreover, there are varieties of oils whose com-

mercial uses have not yet been fully developed or which are known only to technical chemists. A thorough and scientific study of the sources and characters of various oils are, therefore, absolutely necessary. There may be occasional cases of people making their fortunes by getting hold of a formula, but a teaching institution never undertakes to deal with formulæ, the only way to success being to approach an industrial subject in a scientific spirit and to devise one's formula according to his own light and experience as a result of practical study and research. One of the chief advantages of soap-making is that it may be started with a small capital in a single room and with ordinary appliances. As his business grows, he may set up the plant for extracting the valuable bye-product, namely, glycerine, out of soap, thereby adding largely to his profits.

### (iii) Leather Manufacture and Preparation of Vegetable Tannage.

**Chemistry of Leather.**

India has an abundance of the raw materials necessary for leather manufacture, namely, hides and skins as well as tanning materials. The export trade of raw hides and skins was estimated at about 7 crores a year of raw hides and 3½ crores of goat's skin or at a total of 10½ crores annually. For some reason or other this voluminous export trade has dwindled down lately. But this reduction in the value of export

trade in respect of raw materials will force the dealers to convert the raw materials into manufactured articles, thus leading to the establishment throughout the country of tanneries. No tannery can be successfully worked without a knowledge of the scientific principles underlying the manufacture of leather and the treatment of tanning materials. In other words, a knowledge of the chemistry of leather is indispensable if students and capitalists propose to take advantage of the latent wealth waiting to be exploited by the application of science. A good deal of information regarding manufacturing processes, tanning materials, preparation of tannage, machinery, appliances and even pits to be dug and labour required, will be found in Ghosh's "New Chemical Industries" already referred to. The leather industry is a good opening for leather trade people to be educated in the applied science of Leather Chemistry which will not only provide a high cultural and scientific education as explained under Vocational Education in Chapter III, but may divert the bulk of the present stream of students from the legal and clerical professions into channels of industrial and commercial enterprise if business is combined with scientific methods.

### (iv) Commercial Analyses.

Development of Commerce,

The development of commerce, of mining industries, of forest products and agriculture as well

etc., by analysis of ores, economic products.

as promotion of public health, are dependent on analysis. Firms dealing with mineral ores and economic products, also planters and agriculturists, require samples to be analysed in order either to appraise the value of their commodities or to improve their qualities. The more those firms take an intelligent view of their professsions the more they will require the services of qualified analysts. As in the medical profession, there are also quacks in the analytical line and if the couutry is to be supplied with qualified analysts as with qualified doctors, there should be arrangements all over the country to train people as analysts. A portion of the whole range of analytical work is learnt by medical students on the one hand and by Indian University graduates in science on the other. This little learning in the analytical field does not qualify one to be an analyst as explained elsewhere, pp. 59-61. Moreover, analysts are now required by leading municipalities. Analysts are reported to be required for the Calcutta New Market. If there is any reason behind such requisitions, analysts are necessary not only for one market but for all markets in Calcutta, and not in Calcutta alone but throughout India, not only for milk analysis but for the examination of all food articles, drugs, chemicals, mineral ores, etc. There is now a little awakening as to the importance of analysis and Indian students will be well advised to take to this line as a profession as is the case in all civilised countries.

The School of Chemical Technology, Calcutta, is already prepared to admit students for training in this new profession in India.

### (v) Investigation of Indigenous Drugs.

Scientific cultivation and Manufacture of indigenous drugs.

India offers a great field for making a systematic effort to grow several of the vegetable drugs and this effort, if scientifically carried out, would be a commercial success similar to the one achieved with quinine productions in this country, to which we have referred in Chapter IV, pp 81-96. The agricultural and gardening work involved in the scientific culture of drugs may be carried out, in the initial stage and even for a few years, in the garden houses of several gentlemen, in school compounds and even by pot cultures. The bulk of indigenous drugs are derived from ordinary flowering plants which could be easily grown, say, in the Eden. Zoological and Botanical gardens, Calcutta, with the co-operation of the authorities concerned, entailing no extra labour on the staff employed therein, while providing a healthy and an inexpensive mode of education in a more practical way than can be claimed for any other scheme of vocational education. The medicinal effects of several drugs vary under cultural conditions of light and shade, moisture and manure, and while a good deal of extremely interesting and scientific education will thus be most economically provided for within an easy reach of the

student, the manufacturing business may be proceeded with by the utilisation of the almost unlimited resources of India's forest products, such as nux-vomica, myrabolams, belladonna, hyoscyamus, etc., a complete list being found in Mr. Ghosh's book already referred to and the amount of capital, labour, etc., being dependent on the nature of, and the demand for, the raw material it is proposed to utilise. A pioneer industry in drug cultivation and manufacture rigidly on scientific lines, as insisted on in the book referred to, and also in preceding pages 81-96, may be started on co-operative principles, the bulk of the necessary capital being found by those who are desirous either of being practically instructed in manufacturing work, on a commercial scale, or of purchasing cheaply genuine drugs and other preparations hardly obtainable in the market at the rate and quality guaranteed by the co-operative method. The machinery that will be employed in turning out products will render it possible for a large number of pupils to receive instruction in batches and to enjoy the profits of the whole organisation. The scheme is a practical one and may be proceeded with at once, should a sufficient number of students enroll themselves, taking out theoretical and laboratory courses of instruction half the day and devoting the other half to practical work in gardens.

**Outline of a co-operative scheme.**

### (vi) Public Health Work.

From personal experience and from information privately obtained, it is gathered that Bacteriology and Chemical Analysis (*i. e*, examination of blood, sputum urine, fæces, etc.) have each a great future in India. It has already become a fashion with several doctors to ask for an analytical report on one or other of human excreta before any medicine is prescribed. This examination will, it is anticipated, gradually become indispensable in every case of illness not only in Calcutta but throughout the muffassil. Necessary training in clinical analysis is now obtainable only in Medical Colleges, but admission thereto is open only to a limited number of candidates and the course extends over six years. Compared with these disadvantages the facilities offered by the School of Chemical Technology are of incalculable benefit to all communities, being calculated, as shown in pages 69-71, to train a useful body of workers to further the cause of medical relief and of social service throughout the length and breadth of the country. Homœopaths. Kavirajas, Hakims, and even Midwives will largely profit by a course of instruction in clinical analysis which will help them materially not only in the performance of their professional work, but also in earning money, handsome fees being payable for each case of clinical analysis.

Clinical Analysis.

A few of the lines that open out to aspiring students are set forth in the preceding remarks;

**Further New avenues of employment.**

there are many other lines that will readily suggest themselves, as the student progresses in his labours. There are the many avenues offered for the manufacture of bye-products that give such immense profits in European countries. The legal and other professions open only to those with literary degrees are already overcrowded. India is just beginning to develop her immense industrial resources. The field outlined by the School of Chemical Technology is open for industrious young men throughout India to develop their own industries, for which only tact, ability and generally small capital are required. There is room not only for such a school, but for a hundred other such institutions to cope with the industrial expansion of the country. The School of Chemical Technology, Calcutta, offers its own facilities for industrial undertakings to worthy students, and it is earnestly hoped that many a young man will take advantage of the present situation.

## CHAPTER VII.

### Science and the Bread Problem in India.

In one form or another this question has been discussed almost throughout this volume. There is scarcely a public body or any public opinion in India that is not alive to the great bread-problem. Leading men have discussed it, associations have moved resolutions on it, and Government through the Legislature appointed a Committee of Inquiry on it. Our youths, who are still receiving education, though not having very serious responsibilities, are not so happy as are generally supposed to be. Each occasion of success or failure in an examination brings back the sickening reminder as to what is next to be in order to earn a livelihood. Parents are more than anxious; barred on all sides when seeking careers for their sons and daughters, they are driven to a state verging on desperation. A few may be well provided for, but they are few and far between, the bulk remain uncared for and unattended to; there is little wonder if there is so much anarchy in the land, when the means of support do not appear to be forthcoming to able-bodied, able-brained young men, who know not what else to do besides.

Public attention to bread-problem.

Gloomy outlook.

The position throughout the world, so far as the bread-problem is concerned, is far from hopeful; it

is more so there in India. Many causes are attributed ; the waste of the late war, trade depression, the falling off in production, instability of exchange, the complexities of Central Europe, and even Indian and world-unrest, are a few of the outstanding features alluded to.

That there was unemployment before the world-war is not denied ; but that it has grown by leaps and bounds in the past few years is more than apparent. The question is a complex one and as such admits of no easy solution.

**Causes assigned.**

Confining our attention to India, and to Bengal especially, where a Committee of Inquiry was instituted, we may consider the points raised by the Committee and repeat what we suggested in July 1923 as the best remedies in reply to the Committee's questionnaire issued in June 1923.

In a tabular form the position may be outlined thus :—

## Questionnaire with Answers.

(i) **Causes of Unemployment. Those inherent in the members of the class affected :—**

**Causes of unemployment, first category.**

(a) A false sense of the dignity which the members attach to office and administrative work requiring literary qualifications.

(b) Disinclination of these members generally to accept manual work.

(c) The idea that literary university education is the only road to progress and advancement in

society. The idea is especially encouraged amongst Bengalee Hindus by the dowry system.

(d) The general physical deterioration of the people in general (Anglo-Indian and Indian) owing to climatic influence, disease and poverty, all of which act and react on one another.

Remedies suggested for (1) (a), (b), (c), (d).

Remedies suggested by the School of Chemical Technology, Calcutta.

(a) and (b)—Official and social recognition of the dignity of all labour (1) by the extension of the franchise on the basis of a single vote to each voter, whether he be a "hand or head labourer", the hand labourer, *i.e.* the peasants, and other labouring classes being *first* given the primary education in three "R's."; (2) by removing untouchability; (3) by the opening of more technical and agricultural institutes through private enterprise or aid by Government grants, especially in the vicinity of Village Unions, District Boards and Municipalities. The Government Department of Agriculture and Industries to be reduced to a minimum to prevent the administration from being top-heavy and overcrowded with experts with sinecure offices; only model farms and pioneer factories to be maintained at Government expense when and where necessary, on a commercial and profit-bearing basis and a great deal of initiative and control left to educated Indians and intelligent *ryots*; (4) by holding industrial and agricultural exhibitions, including cattle shows, especially in village centres; and (5)

by the encouragement of the manufacture of indigenous products by a large purchase of them, wherever available, by Government or other public bodies, in short by the application of scieutific methods, organisation, tact, and economy wherever possible. (c)—Avoidance, as much as possible, of higher literary (Arts and Pure Science) education, except in the case of persons of means and of marked ability, according to the principles already discussed, pp. 42 and 101, while at the same time encouraging deserving students, by a system of endowments and scholarships, to take to such pursuits. The present shoaling of students towards university careers requires very thorough weeding. (d)—Co-operative movement in the shape of co-operative agricultural concerns, co-operative cottage and other industies, co-operative medical relief, sanitary and other public works. The prohibition of the drink and drug habit, especially among labourers. The laying out of better housing accommodation, especially in congested areas, the institution of sports and other healthy pastimes.

**Causes of unemployment, second category.**

**(ii) Those resulting from the existing system of training and education open to the members of the classes affected :—**

(a) The unpractical character of the present literary qualifications as provided by existing schools and colleges without dilution with a course of manual and business instruction, the defects

being pronounced by inducing a feeling of helplessness in any domain other than literary.

(b) A lack of conception as to the importance of a practical course of training and absence of provision therefor under the present system of education.

(c) Excess of supply over demand in administrative, clerical, teaching, legal and other learned professions.

**Remedies suggested for (ii) (a), (b), (c).**

**Remedies suggested by the School of Chemical Technology, Calcutta.**

(a)—Compulsory combination of manual and business training with the literary curriculum in the primary stage for agricultural and industrial workers either by birth or choice, the character of manual work and provision therefor in schools being varied according to the position and requirements in life of the pupil, thereby enabling him to take to some suitable form of manual or business training which will be helpful in his future career, mapped out according to his family or caste occupation or his natural aptitude, if shown in a marked way. This is the principle advocated throughout this volume.

(b)—The establishment of technical and technological institutes on a small or a large scale throughout the country instead of being located in cities only ; and the co-ordination of this training with secondary and university education, the training being given in the vernacular where required ; it being distinctly understood that there is a great deal of difference between technical and technological

institutions, the one being for the creation of workmen and mechanics and the other for the development of higher and lucrative industries, together with the improvement of agriculture and sanitation by the application of science, as explained in Chapters I, III, IV and V.

(c)—Recognition generally (with noted exceptions) of the principle that a son should follow *ordinarily* his father's profession if an Anglo-Indian or a Mahomedan, and the caste occupation, if a Hindu; the highest kind of cultural and scientific education being open to people of all castes, (barbers, cultivators, dhobies, potters, tailors, sweepers, weavers, etc.), if marked ability for such education be shown as is referred to in Chapter III under Vocational Education on Caste lines. It must be distinctly understood that the principle of sticking to one's caste or family occupation is being recommended purely on economic and scientific grounds and has nothing to do with other aspects of castes, whether objectionable or unobjectionable, which will no doubt disappear if general literacy and technological training are encouraged.

Cause of unemployment, third category.

**(iii) Those resulting from absence of information as to any but a few well-known fields of employment.**

**Remedies suggested.**

Remedies suggested.

Restriction of higher literary education (Arts and Pure Science) by the levying of a higher rate of educational fees, thereby giving teachers better

remuneration for more thorough work : the maintenance of scholarships and endowments for poor but deserving students seeking literary education ; the opening of Bureaus of Information to guide students in the careers they may advantageously take up after passing through the University ; the encouragement of apprenticeships for young men and women, from the age of 14 upwards, in conjunction with commercial and industrial concerns.

**(iv) Financial inability of parents in the majority of cases to pay for adequate literary, technical and technological education and to start their sons in business.**

Cause of unemployment, fourth category.

**Remedies suggested.**

Encouragement of the principle of co-operation by the establishment of a network of co-operative societies resulting in the institution of scholarships for higher education, for the training of apprentices and for the founding of factory and farm schools in educational colonies according to local requirements, with an eye to economy, and according to principles mentioned under (ii) (c).

Remedies suggested.

**(v) Lethargy.**

Cause of unemployment, fifth category.

**Remedies suggested.**

**Establishment of free primary schools and the granting of compulsory education up to the age of 12 by legislation ; primary education to include some form of manual training, agricultural or industrial, to suit local and individual requirements in village and town areas.**

Cause of unemployment, sixth category.

### (vi) Lack of Character.

#### Remedies suggested.

Extension of social service work, cinema shows and exhibits of educational, moral, public health, and economic value; the formation of clubs; organisations such as the Boy-Scouts, Reading Rooms and other such amenities designed to provide elevating recreation and tending to disseminate higher thoughts and ideals.

Unemployment due to economic causes.

It is obvious from the above analysis that the present state of unemployment in this country, especially among the middle classes, Indian and Anglo-Indian, is chiefly due to overcrowding in literary occupations to the exclusion or neglect of other careers which had sustained the people before the introduction of the present form of literary education. Other causes have been contributory as well, each of them requiring to be dealt with in its turn, which in the end tend to destroy the social equilibrium and to create a chaotic condition as shown in p. 101.

In former days there was a need for the young to train for literary careers, the posts of clerks and underwriters in the East India Company's agencies being many. When the Government of India took charge of the Company's territories such posts were still available; for Government offices still held promising prospects to young men having a literary education. The mercantile and trade

concerns which were in most cases distributing centres only, for the goods were manufactured in the most, likewise offered lucrative careers to clerks and accountants. But times have changed. The demand has been met. The offices and mercantile houses are overcrowded. Commerce and industry, indigenous concerns, are needing more and more pioneers to start new enterprises. It is here where technical and technological education, as explained in previous chapters, steps in. To meet the present day demand it is necessary to train our youths to enter such *prosperous* and *independent* careers wherein they, their children, and their children's children, will benefit. The necessary institutions to provide the requisite technical training will have to be created by municipal and private efforts as is the case in all countries. Technical education will have to be realised and pursued in its *widest* sense instead of taking it to mean only mechanical and electrical engineering. Sanitary and chemical engineering, as also industries based thereon, will have to be included in schemes for technical training and private efforts will have to be largely encouraged.

Changed circumstances.

Need for new enterprise, and independent careers.

It requires then the co-operation of all public-spirited people working together for a way out of the intricacies of the bread-problem which is but briefly outlined herein, and if it is true that where there is a will, there is a way, the solution is not far off from our reach. The recommendations of

Solution by co-operation.

the Unemployment Committee, Bengal, to which we next refer, are of interest in this connection and may be carried out in their spirit.

### Middle Class Unemployment.

The recommendations made by the committee appointed in November, 1922, to investigate unemployment among the Indian and Anglo-Indian middle-class communities in Bengal were noteworthy both with regard to the delay that occurred in the submission of the report, and also as regards the thoroughness and common-sense which characterise some of the suggestions made and which largely extenuate the delay involved.

**Recommendations of the Unemployment Committee.**

The suggestions, *first*, for the acceleration during the present depression of all public works construction already initiated or under contemplation, and, *secondly*, for the appointment of a public works commission with power, both executive and financial, to control the incidence of large Government public works schemes, are extremely practical. It is, however, doubtful whether the proposed employment bureau, if established, would be successfully worked or would meet the needs of all the communities concerned. But the crux of the whole question apparently lies in the reforms that might be carried out in the prevailing system of education and in the support that may be lent by parents and guardians in changing the outlook of their wards.

It may be taken for granted, as shown elsewhere, pp. 9 and 40, that it is not possible to provide

educated youths *en masse* with suitable billets, even if Indianization of services were carried out to its furthest limits, and that at least 90 per cent. of these classes must strive for independent careers either in agricultural, commercial, or industrial pursuits. If this view be true, the whole system of education and the angle of vision of our young aspirants must be entirely re-adjusted, and until this new orientation is provided, there scarcely appears to be a radical cure for the malady of unemployment. It is, however, very hopeful to find this view reflected in the committee's suggestions with regard to (1) the application of technical education in its *widest* sense, (2) the extension of village education in closest touch with village life, and (3) investment of capital in large amounts in agriculture, irrigation, and communications. With the co-operation of all classes and communities (the matter being above party politics and communal jealousies), several, if not all, of these and other commendable remedial measures may be forthwith tried—suggestions which are open to financial difficulties only being left for further consideration. For instance, the suggestion that experiments be carried out to determine whether agriculture can be made a profitable occupation for Bengali *bhadralog* is attended with risks if it is contemplated to open experimental farms or agricultural colonies.

New orientation.

Taking Bengal to be what it is, and avoiding all Utopian ideas of merging innumerable small

holdings of *ryots* in large areas for cultivation with machinery, there seems to be ample scope for the educated classes in agriculture. This education does not mean the cramming of book knowledge and the undertaking of unproductive laboratory work for university examination purposes, but it means the application of science to practical problems, both agricultural and industrial, either in large or small ways. With all the emphasis it can command the School of Chemical Technology, Calcutta, has long been insisting upon this idea and it is for the educated middle-classes to choose what is conducive to their interests.

**Application of scientific methods.**

## CHAPTER VIII.

### Concluding Remarks

#### Unemployment.

Middle-class unemployment in India, which it is sought to remedy by the suggestions made in the preceding chapter, is apparently a serious menace to the cause and progress of this country. The middle classes everywhere form the backbone of a nation and the subject which affects their well-being, demands a still further scrutiny than has been already applied to it.

It has been a truism since centuries ago that "knowledge is power" and that education and success are generally associated. Nevertheless it

Wide unemployment.

is a fact—a hard fact and a puzzle indeed—that in spite of a rise in the extent and standard of knowledge and of education with the progress of civilisation, there is wide unemployment everywhere and that the bread-problem in India was never more acute than it is to-day. It was admitted in a government *communiqué* issued by the Unemployment Committee in 1923 that the situation was getting worse day by day. The issues involved are large and intricate and it is the duty of every citizen to contribute in his own way towards the solution of the problem. It would be foolish to pretend that, in writing on a subject like this, one could explore the whole field, indicating all possible means as to how to earn a living, and suggest all remedies as to how to end unemployment. The most that is possible is to look at the subject from one's own standpoint, as is always the case in dealing with any problem, and to expect the public and the press to present other aspects of the case, thereby taking an intelligent interest in a matter which concerns their own common weal.

### General Unrest.

Unemployment and unrest.

It is apparent that there is general unrest all over the world. This unrest is associated more or less with unemployment. Since the end of the war unemployment has become more prevalent than ever before. In other countries it is the

**Unemployment, its character in India.**

labouring classes who are mostly affected. In India, however, the suffering is more acute, nay worse, among the educated middle classes, namely, the *bhadralog* including the Anglo-Indian community. Many of these middle-class people have been thrown out of employment owing to retrenchment and other causes and are unable to earn any kind of living wage despite their unremitting efforts.

### Anglo-Indian Distress.

Anglo-Indian distress which is more talked of and which appears more often in the newspapers, may be attributed either to competition with the imported European and the ex-soldier, or to the Indianization of services while educated Indians, particularly in Bengal, who are no less sufferers, are finding the door shut and are getting ousted by competition with other classes who are either more qualified or more laborious.

### Extent of Unemployment.

Statistics of unemployment are difficult to obtain. It was, however, reported once in a leading newspaper that about 1,500 qualified medical practitioners were starving at Calcutta and that in Bengal alone there were at least 75,000 young men of respectable parentage who were seeking clerkships. More definite information is available with regard to Anglo-Indian unemployment and figures are published now and then by the relief

committee at Calcutta, which show that so high a percentage as 33⅓rd per ecnt are bordering on pauperism. It is asserted that the *bhadralog* unemployed who have the joint purse of their families to support them are at a less disadvantage than the Anglo-Indian who, if unemployed, are at once thrown into the streets unless supported by public or private charity, In either case the strain on the family and on the charitable remains unmitigated until means are found to end the regrettable unemployment obtaining in the country.

### Causes of Unemployment.

Causes.

Apart from the general remarks made in Chapter VII, we note that, so far as Bengal is concerned, the Calcutta University which is so often maligned, is largely held responsible by some people for the present state of unemployment amongst the educated Indians. But the Anglo-Indian community who are co-sufferers, are mostly independent of the Calcutta University, having had their own system of education under the rules applying to European schools. On the other hand, the Armenian community who are allied to the Anglo-Indians and who follow the same system of education as the latter, as also the Parsees, the Jews and the Marwaris who generally take very little advantage of the facilities offered by the Indian Universities, have practically no unemployment amongst them. The causes of

**Causes deeper than what is apparent.**

unemployment are, therefore, more deep-seated than what we profess to arrive at by casting thoughtless aspersions at the Calcutta University or at the present system of education in general. The subject has been more fully dealt with elsewhere under "Science and the Bread Problem in India," "Science and Industry," "Evolution of Technical Education", and practically in all discourses that precede these concluding remarks. The fact of the matter is that unless the middle-classes change their whole outlook of life, radically uprooting the exotic growth on social ideas and habits, and unless also there is a change of heart amongst the rich and the landed aristocracy, unemployment is inevitable and it is not possible for any government, committee, or enthusiast to apply a sovereign remedy when unemplyment is general and not confined to any particular community.

**The late Hon'ble Mr. B. N. Basu's Warning.**

It is incumbent upon students and their guardians to be impressed with the gravity of the situation and to accept that the chief responsibility rests on them. No university compels a student to come within its fold, nor does it guarantee prosperity to its votaries. In fact it does not offer anything beyond contentment even in poverty if education is to be pursued for its own sake, a principle for which all university education stands. We now stand at the parting of the ways. It is

for us to choose which way will lead us to success. Be it said in tribute to the memory of the late Mr. B. N. Basu, the late Vice-Chancellor of the Calcutta University, that he was the first Vice-Chancellor to throwout a serious warning to all when he remarked that the Bengali people were as much responsible, in fact, more responsible for the state of things that had come about from putting the smallest child in every house in training for a university career without any thought as to whether the child did or did not show real aptitude for such a career. So far as university examinations are concerned many pupils have undoubtedly the aptitude to pass and if this qualification is only to be a means to an end, one should find whether there is a reasonable chance of success in the line he is going to select. Without some such action university education is a trap for the unwary and a fruitful source of unemployment and unrest in the country. It is, therefore, safer generally to follow a vocation handed down from father to son and thus to have some employment in reserve before entering upon a university career. This arrangement may restrict free scope for individualism, but is preferable in the interests of the public and of orderly social progress, as explained in the preceding chapter, pp. 130 and 132.

Responsibility of parents.

**Crux of the Question.**

The trodden path of literary and pure science education and of university degrees, which was

**University training, a delusion.**

hitherto held to be the only royal road to position in life is now found to be a delusion. Some other way will have to be discovered. The question is a most difficult one. Even the people who are largely affected are afraid of tackling it and they placidly let the inevitable take its own course. It is never suggested that literary education is useless. Without this there would have been no Rabindra Nath Tagore. The greatest thinkers who have moulded the destinies of nations are in most cases products of literary education. All human emotions are expressed through literature which builds character and which reveals the best and the noblest in human life. But the world cannot get on with literature alone; for man does not live by bread alone. Other calls will have to be equally attended to. The crux of the question is what will provide bread and what education will solve the bread-problem.

### Improvement of the Soil and the Cattle.

**Agricultural and industrial developments as solutions.**

It is common knowledge that it is the soil and the cattle from which we derive our food materials. They correspond as it were to the heart and the lungs of the human body. These two sources of food supply must be kept in order, rather more and more efficient, for the bread-problem to be entirely met, or the country must be so industrially advanced as to leave no room for unemployment and to be able to pay for all requirements obtained

from outside. America is one of the greatest agricultural countries of the world and is equally noted for her industries. The value of her agricultural and industrial products is counted in billions of dollars. It is open to India to occupy the same position or to go down in the scale of nations. All the resources of science must be brought to bear upon the all important problem of improving agriculture and industries instead of allowing education to be frittered away in literary and other directions.

Example of America.

**Ideal Education versus Practical Education.**

It is true that the ideal of education for education's sake, as was the case among the Brahmins and Moulanas in India and the clergymen in Europe, must be held up at all costs, but in practice there are a very few who can pursue this ideal and who do not perhaps number more than one in a thousand. Education for the remaining 999 is a means to an end and unless a reasonably large section of the educated classes take to agriculture, industries, business and commercial enterprises,—and in plain words there is no other remedy—it is impossible for the services, and the learned professions to absorb the whole output of education, the supply being increasingly more than the demand, a fact which is entirely responsible for unemployment now and in the future. Moreover, the fact of the educated classes running

Only remedy.

*en masse* after office employment only, or after literary and administrative careers is not one to be proud of. This is rather the curse and not the goal of education. The nation-building departments of agriculture, sanitation and industries require that a large number of young men and women should be trained in several branches of Applied Science to pursue *independent* careers therein, however hard they may find their lot to be there either to begin with or throughout. They should feel that there is a pleasure to be independent, which is above any money value, while they may rest assured of a living in these practical lines of national welfare against actual starvation in many instances, as at present, in purely academic, clerical and semi-technical lines. It may also be recalled that every ounce of technical labour in the field, factory or disease-stricken areas is designed to add to the wealth and happiness of the country and is not of the class of "robbing Peter to pay Paul" and that the education which will bring together in closer relation, a labourer doing the hard work on the one hand, and the educated guiding the labour, on the other hand, with the vision afforded by a knowledge of Applied Science, is worth working for and is indeed a blessing. Even the profession of middlemen, which is vital in commercial life and which supports millions of people, is worth more than fighting for the loaves and fishes of office.

**Need for independent careers.**

The question that next arises is how the capital needed will be provided to give the educated a start in life either in business, farming, factory or laboratory. This bogey of capital is a great impediment no doubt. But experience shows how to overcome difficulties. In fact there is no need for capital in many instances, such as in working as middlemen. It is experience which is often more in demand than capital. There must be a period of apprenticeship following a course of theoretical training and the *efficiency* acquired will solve what will otherwise appear to be unsolvable. There are straight cuts to these practical lines and both time and money will be largely saved, which are otherwise generally wasted in university careers followed by a period of helplessness, and this saving must be taken as a valuable asset equivalent to the initial capital that may be required. Moreover, an apprentice in any of the practical lines referred to will generally be able to earn, thereby contributing to the required capital, and by the age of 20, one is likely to be a self-reliant and a self-made man or woman, which is beyond expectation, on an average, even at the age of 30 under the present system of university training and under the courses of instruction obtaining therein. **How to find capital.**

We are concerned here with the cases of the 99 per cent. of people who are either poor or are of ordinary ability. We have already considered in previous chapters how they are to be **Training in Applied Science.**

educated. Our main suggestions throughout are that these classes who are either hand or head labourers, should undergo a training in one or more branches of applied science.

The stages of education preliminary to a training in applied science are :—

(1) *Primary*.—Factory labourers, both men and women, as well as children, should be taught just as much of three R's as will enable them to understand their own work and to take up in addition Factory Hygiene and Labour Welfare work with some intelligence. Labouring classes in urban and rural areas will attend free primary schools provided by Municipalities, District Boards or Village Unions as the case may be. Further particulars are dealt with in Chapter I. on "Evolution of Technical Education", pp. 1-20.

**Nature of primary education needed.**

(2) *Secondary*.—Ordinarily this education need not go beyond Matriculation. The present I. A. or I. Sc. classes will eventually constitute the School Final, as advocated by the Calcutta University Commission, in order to qualify a student for admission to a Technical Institute or a vocational course. Where no such preliminary qualification is insisted upon, seekers after knowledge in applied science should be freely encouraged to be introduced to science subjects generally according to their hereditary vocations. Scholarships may be provided for deserving students of recognised ability and intelligence in every sphere of life. It is, how-

**Nature of secondary education needed.**

ever, open to the rich, to the able few, or scholarship holders to proceed further in studies without restriction as suggested in pp. 42, 130 and elsewhere; but university degrees for professions may be made more difficult and more fees required to pay for better professors. Degree examinations for medical qualifications are already stiff and nothing more than a revision of the current syllabus appears to be necessary, as recommended in an editorial article in the May 1924 issue of the Indian Medical Gazette, to which reference is made in Chapter IV, p. 60.

Courses of Mechanical, Electrical and Mining Engineering attract a good number of young men, as there are chances of ready employment in workshops and mines. These courses extend over 3 to 6 years and unless a craving is aroused for *independent* careers, there is not much difference whether the educated are employed as clerks or as mechanics It is true that the technical instruction which would turn the would-be clerks into mechanics, basket weavers and clay modellers is often suggested as a remedy against unemployment. This appears to be only a make-shift arrangment, for there is a chance of overdoing, which is already apparent, in mechanical instruction as has been the case with clerking. Further, a nation of clerks, of craftsmen, and of mechanics only, although mechanical knowledge is indispensable for all agricultural and industrial developments, is hardly

likely to achieve anything. What is wanted is the rise of a class of sturdy agriculturists, industrialists, sanitarians, and businessmen. It is no doubt foolish to think of nothing but one remedy only as a panacea for all evils, and bearing this in mind the writer refrains from making any such suggestion in these discourses. Our people are very often confronted with alluring schemes, but we must remember how many of them have ended in a *fiasco* and how many more are likely to follow suit. This is generally the case when schemes are hoisted with other people's money and it is always safer to know where the danger lies than to proceed without a warning. With discretion and self-reliance to depend on, we may steer clear of most dangers.

**Other lines of training.**

Engineering apart, there are numerous other industrial lines, such as are dependent on the application of Chemistry, Biology and Bacteriology. The work involved is clean, highly theoretical and practical combined, and is well-suited to the tastes and status of the educated middle-classes, whether Anglo-Indian, Mussulman or Hindu. The courses of instruction may be largely modified according to individual requirements and as employment is not likely to be found for the trained until there are big industries in the country, every pupil is expected to enter upon a course with a determination to start a cottage industry on completion of training and apprenticeship. If this ideal is

pursued, a very large number of cottage and agricultural industries adapted to Indian conditions will spring up throughout the length and breadth of the country. Helped by co-operative credit societies, manufacturers' associations, brokers' unions, distributing agents, international trade developers, and insurance against unemployment, the good work once initiated will progress in rapid strides, solving the problem of middle-class unemployment in India which it is hardly possible to end by doles of charities, committee reports or by distribution of what often happens to be the veritable apple of discord.

### Cottage Industry *versus* Mass Production.

Cottage industries.

As an instance of cottage industry and in view of the charm introduced by the personal touch of Mahatma Gandhi, *charka* now looms large in the eyes of the Indian public. Much has been said both for and against *charka*. But one outstanding feature is that this industry is an index of the people's will to stand on self-help. Nations go to the utmost of sacrifice to maintain ideals and rights and consequently it is not too much to expect the sacrifice of half an hour for this labour of love if we are not disposed to call *charka* an industry in the economic sense. It is, however, a fact that there is a tremendous waste of human energy in gossiping, sleeping, in unduly prolonged recreations and in unrestricted indul-

gence in evil propensities. If *charka* succeeds in converting even a portion of this national waste into productive labour, its economic value is more than justified. It is true that *charka* is no more handy and economically useful than a sewing or a knitting machine workable in every home, but there is more potentiality in the *charka* than in the machine. It is also much easier and cheaper to provide a *charka* which in every school will not only produce a few yards of yarn daily to be pooled in the national stock, but which may be used as a most convenient and harmless instructor to stimulate in every pupil a mechanical and an inventive skill simply from the fact that a *charka* is capable of being very largely improved. It is most dangerous and objectionable to allow boys and girls at an impressionable age to be associated with artisans in deference to the mania of some people to instruct school children in polytechnic. But the dangers inherent in such associations are not likely to arise when *charka* is employed. There are methods of introducing technical instruction and this point is dealt with in more detail elsewhere. Handling of heavy tools induces a clumsy physical feeling which often finds its expression in objectionable gestures and postures and in morbid ideas of relaxation which are the evils of a factory life and school children under no account should be brought face to face with such evils. There are, however, people who would strongly recommend mass

Charka.

production on economic grounds and in the interests of developing highly finished and consequently more efficient factory products. The world is moving in this direction and its progress cannot be arrested. But this is no reason that all cottage industries should be allowed to be swamped. By judicious distribution we may encourage both the activities, thereby stabilising hereditary vocations as well as the beauty and peace of home work on the one hand and the mass or factory production on the other which no doubt has great advantages in finding leisure and in rendering life enjoyable in various ways.

Mass Production.

Having regard to the prevailing poverty amongst the middle-classes and to the need for providing immediate means of livelihood for them, we cannot do better than to furnish some useful information in a compact form as an eye-opener. Ignorance on many occasions breeds distress which could be avoided if timely information were available. There may be enough of lip-deep sympathy, but a true friend is one who extricates a sufferer and provides him with even partial relief if not with success at once. There is no truer and better friend than a handbook of useful information carefully and accurately compiled. There is an immense amount of extremely valuable information if only one knows where to find it. A good deal of this useful information has been obtained from the Government of India departments and the provincial

Value of useful information.

governments to whom the writer conveys his most grateful thanks both in the preface and in the introduction to Appendices. The subjects discussed within the narrow compass of this volume are designed to be helpful and if this hand-book priced to suit the pockets of every student and every family, coupled with the information found in the appendices, proves to be a real help in the sense it is given, the writer will have the satisfaction that his labour has not been in vain and will feel encouraged to provide further information in subsequent editions which depend on the response the present issue receives. More satisfaction will be felt if these discourses prove convincing that the goal of education is not ordinarily to seek only employment on completion of a university career but to pursue education as a life-long occupation in order, *first*, to improve one's hereditary vocation by the broad outlook imparted by knowledge, *secondly*, to make his fortune or to lay his bones therein rather as an independent man than as a servant and, *thirdly*, to serve his country and fellow-beings as a law-abiding and conscientious citizen. Under this arrangement no question of application for employment will ordinarily arise. Consequently there will be no unemployment and every one will prosper in his or her normal way both intellectually and spiritually, thereby giving to the world peace and contentment instead of strife and discontent.

**Helpful suggestions.**

# APPENDICES

**Latest Particulars of All-India and Provincial Services, Commerce, Trade and Industry—**

*compiled chiefly from information very kindly furnished by the Govt. of India in the Home Department, several local Govts. and otherwise obtained.*

**Assistance rendered by the Govt. of India and local governments.**

The very material assistance received from the Government of India is hereby most gratefully acknowledged. Information from two out of nine local governments having not been available till the end of December 1925, it has not been found possible to show the diverse rules relating to provincial services in various provinces in their entirety and the provincial portion of the appendices has been prepared in a general way following the excellent summaries obtained particularly from the Governments of U. P. and Bombay. The Government of Burma very expeditiously furnished all particulars relating to their province, which is very much appreciated, and full advantage has been taken of materials received up to the 31st December, 1925, from local governments to whom most grateful thanks are hereby conveyed. Necessary alterations and improvements will be made in subsequent editions when it is confidently hoped much fuller information and better co-operation will be forthcoming.

CALCUTTA,
*December 31, 1925.*

J. C. GHOSH.

*Demi-official letter No. D. 4253-Ests, dated Delhi, the 26th March 1925, from the Government of India in the Home Department.*

DEAR SIR,

In compliance with tho request contained in your letter, dated the 17th October 1924, I send herewith copies of regulations for admission to various services in India together with a statement showing the sanctioned strength, pay, etc. of the services.

Yours truly,
(Sd.) E. H. BRANDON,
Asst. Secretary to the Govt. of India.

To
J. C. GHOSH, Esquire,
Principal, School of Chemical
Technology, Calcutta.

## APPENDIX I.

### INDIAN CIVIL SERVICE

**Prospects and traditions of the I. C. S.**

The Indian Civil Service, which is otherwise known in some quarters as the "Heaven Born Service," stands foremost among the public services of the world both in respect of the power, prestige and prospects that it carries and of the glorious traditions that lie behind it. The popularity of the Service received, however, a set-back on the introduction of the Reforms in 1919. But thanks to the prompt action taken for improving the prospects of the Service on the recommendations of the Lee Commission, also to the vigorous propaganda work carried on by the India Office throughout the British Universities, the apparent waning of the popularity has been arrested as indicated by the larger number of British candidates for the Indian Civil Service examination in August, 1925. It is reported that while the average number of European candidates during the years 1921—24 did not exceed 21, the number rose to 70 in 1925 for the I. C. S. alone excluding Home Civil Service and Eastern Cadetships. This gratifying result is attributed to the removal of the misapprehensions which prevailed since the passing of the Reforms, and in referring to the subject at the farewell banquet at Simla, His Excellency the Viceroy remarked that the pes-

simism which swept over the Service seemed to be disappearing. Continuing His Excellency paid a high tribute to the courage, the initiative, the innate sense of fairness, the capacity to shoulder responsibility and to understand the other man's point of view and to the high standards of character found throughout the Services in India and expressed the hope that in spite of a changed outlook, the members would find "the opportunity for good work and for carrying on their duties according to the traditions of the Services in India—the fine, the glorious traditions of the Services in India, than which no finer exist in any public service throughout the world." Speaking recently at London and apparently referring to the I. C. S., a well-known British officer frankly admitted that he was not aware of work which would bring a fuller reward in every sense of the word,—work which is more thoroughly worth the doing. There was a still better appreciation of the I. C. S. the other day from an independent source and that was from His Majesty the King of the Belgians who, on leaving India, sent a message bearing a wonderful testimony to the devoted and unceasing activities of that *corps d'elite*, the Indian Civil Service.

Appreciation of the I. C. S.

### Indianisation of the Services.

Speaking on the question of increasing the Indianisation of the Imperial Services, Sir Muhammad Shafi, the late Education and Law Member

of H. E. the Viceroy's Council, pointed out that the decisions arrived at in 1924 had increased Indian recruitment from 37.72 to 60 per cent in the I. C. S, from 33 to 50 per cent in the Indian Police and from 40 to 75 per cent in the Forest Service. The Foreign and Political Department has also been thrown open to Indians. These, Sir M. Shafi held, constituted a substantial advance in the process of Indianisation. Moreover, the transfer of the power of appointment to, and control of the Services in, the Transferred Departments, is a step forward in the direction of the Provincial autonomy so strenuously urged by all sections of Indian opinion. Indianisation is not confined to the Civil Services only; although the Army Indianisation scheme of eight units could not be regarded as satisfactory from the Indian point of view, further progress in the direction is expected from the findings of the Skeen Committee. All these reforms result in a larger co-operation, in an increased feeling of camaraderie, and equal sense of responsibility, between British and Indian members of the Service to their mutual advantage instead of disadvantage as was originaliy feared, thereby making them shoulder the burden together, reducing "the white man's burden," softening the racial animosity which characterised some of the discussions in the last few years and finally rendering it impossible for any one to say, even humorously, that in the Indian Civil Service there

**Reducing "the white man's burden."**

is nothing which is either Indian in character, civil in attitude, or indicative of the spirit of service in outlook. The closer association initiated between Britain and India by the Reforms will, in the words of His Excellency Lord Reading, grow daily until it becomes a real living bond between the two countries, standing together for the common good, working together for ideals of humanity and striving together to better the conditions of the people of India. "Thus the benefits of the civilisation of Britain would be joined to those of the older civilisation of India, and India and Britain, bound together by the sacred ties of friendship, would labour hand in hand for the benefit not only of India and of the Empire, but also of humanity." As a last word to the British youths required for the Indian Superior Civil Services, it may be mentioned that the usual attractiveness of these Services has been maintained at an extra cost of about a crore of rupees a year to give effect to the recommendations of the Lee Commission, and as a last word to Indian aspirants it is worth remembering that the accepted bases of Indianisation of Services seem to meet legitimate aspirations for the present and that, in the interests of efficiency and good government, a fair proportion of capable and broad minded British officers in close association with Indian administration may long continue to be necessary without involving a slur on the capability of Indians.

Closer association between Britain and India.

## Regulations for admission to the Indian Civil Service.

**Simultaneous Civil Service Examination.**

An open competitive examination for admission to the Indian Civil Service is held both in London and at Allahabad (India), the date of the examination each year being announced beforehand by the Civil Service Commissioners. An annual notification is also issued by the Government of India in sufficient time before the examination. Copies of rules and of the form of application are obtainable on application to the Secretary, Civil Service Commission, Burlington Gardens, London, W. I., or to the Secretary to the Government of India, Home Department, $\frac{\text{Delhi}}{\text{Simla}}$.

### Subjects for Examination

| | Compulsory. | | Optional |
|---|---|---|---|
| | | Marks. | About 64 other subjects |
| 1 | Essay ... ... | 100 | comprising History, Economics, Law, Philosophy, Mathematics, Science, Engineering, Geography, Anthropology, Agriculture and Language. |
| 2 | English ... ... | 100 | |
| 3 | Present Day ... | 100 | |
| 4 | Every day Science | 100 | |
| 5 | Auxiliary Language | 100 | |
| 6 | Viva Voce ... | 300 | |

Total 800 Marks.

The marks allotted to each subject are either 100 or 200 generally. Only Engineering and Geography are assigned 400 marks each. In the optional subjects candidates are allowed to take up subjects up to a total of 1,000 marks.

(1) Candidates selected at the Open Competition held in London will be required to remain in the United Kingdom on probation for one or two years, as may be decided by the Secretary of State for India in Council.

Chief points of I. C. S. regulations.

(2) Candidates selected at the Open Competition held in India and candidates selected in India otherwise than by competitive examination will be required to proceed to the United Kingdom on probation for a period of two years.

ONE-YEAR PROBATIONERS.

(3) One-year probationers will, at the end of the year of probation, undergo an examination called the Final Examination.

TWO-YEAR PROBATIONERS.

(4) Two-year probationers will, during their period of probation, undergo two examinations—the Intermediate Examination at the end of the first year and the Final Examination at the end of the second year.

Candidates at the Indian centre must be of Indian domicile and must hold a degree of a university approved by the Governor-General-in-Council, or the senior diploma of the Mayo College, Ajmer.

The list of Universities which has been approved by the Governor-General-in-Council is as follows:—

(I) Indian universities—the universities of Allahabad, Bombay, Calcutta, Dacca, Delhi, Luck-

Recognised universities.

now, Madras, Nagpur, Patna, the Punjab and Rangoon ; the Aligarh Muslim University ; Benares Hindu University ; Mysore University ; and Osmania University.

(II) English and Welsh universities—the universities of Birmingham, Bristol, Cambridge, Durham, Leeds, Liverpool, London, Manchester, Oxford, Sheffield, and Wales.

(III) Scottish universities—the universities of Aberdeen, Edinburgh, Glasgow, and St. Andrews.

(IV) Irish universities—the university of Dublin (and Trinity College) ; the Queen's University of Belfast.

Indian students who proceed to England for a course of training preparatory for admission to the I. C. S., the medical profession, the Engineering or for a call to the Bar, have, according to the published list of recognised universities, a large field in respect of their choice as to the universities they may wish to join, and there appears to be no reason for such students to be particularly anxious to be admitted either to the Oxford or the Cambridge University where accommodation is limited and which has accordingly to refuse many applications. The facilities obtainable at London, Edinburgh, or at any other provincial centre, are equally as good as, if not better than, those at Oxford and Cambridge, and if expenses are taken into account, the Wales University colleges at Aberystwyth, Bangor, and Cardiff will be found to be the cheapest

centres. As regards picturesqueness and climate there is also more to attract Indian students in Wales than in other areas. From the point of view of cultural influence of social life, Oxford and Cambridge may have the preference, but the other centres mentioned will no doubt seem to have the balance of advantage in their favour.

Advice to Indian Students.

Indian students are further advised to be careful to provide themselves beforehand with nationality and birth certificates, not only for admission to the I. C. S. examination, but for other examinations as well, also with certificates of attendance at lectures and practical work (including a vaccination course) in case they belong to the medical profession.

## INDIAN CIVIL SERVICE

### Cadre on 1st Jannary 1924...1350

(Monthly rates of pay)

I. C. S. pay.

| Year of Service. | Basic Pay | | Overseas Pay ‡ | |
|---|---|---|---|---|
| | Junior. | Senior † | If drawn in sterling. | If drawn in rupees. |
| | Rs. | Rs. | £ | Rs. |
| 1st. | 450 | | | 150 |
| 2nd. | 500 | | | 150 |
| 3rd. | 550 | | | 150 |
| 4th. | 600 | | | 150 |
| 5th. | 650 | 1,000 or any earlier year. | 15 | 150 |
| 6th. | 700 | 1,050 | 15 | 150 |
| 7th. | 750 | 1,100 | 25 | 250 |
| 8th. | 800 | 1,150 | 25 | 250 |

‡ Every officer of non-Asiatic domicile is entitled to remit his total overseas pay through the High Commissioner at 2*s.* to the rupee or to draw it in London in sterling at that rate. Indian members of the Services who are already entitled to overseas pay continue to draw it and are entitled to the remittance privilege if they can satisfy the High Commissioner that they have wives or children in Europe. In addition to the posts on the time-scales referred to, there are several posts of higher emoluments open to members of the I.C.S. These posts generally carry salaries of over Rs. 3000 to Rs. 4000 a month and upwards, the highest post being that of a Governor of a province with a salary of Rs. 10,000 p.m.

† Certain charges of higher responsibility are classed as "senior" and if it ever happens that a junior officer is considered fit for such a charge, he draws pay on the senior scale even from the 1st year of his service.

## Indian Civil Service—*contd.*

| Year of Service. | Basic Pay Junior. | Basic Pay Senior | Overseas Pay If drawn in sterling. | Overseas Pay If drawn in rupees. | I. C. S. pay. |
|---|---|---|---|---|---|
| | Rs. | Rs. | £ | Rs. | |
| 9th. | 900 | 1,200 | 25 | 250 | |
| 10th. | 1,000 | 1,275 | 25 | 250 | |
| 11th. | 1,100 efficiency bar | 1,350 | 25 | 250 | |
| 12th. | 1,200 | 1,425 | 30 | 300 | |
| 13th. | 1,300 | 1,500 | 30 | 300 | |
| 14th. | 1,300 | 1,600 | 30 | 300 | |
| 15th. | 1,350 | 1,700 | 30 | 300 | |
| 16th. | 1,350 | 1,800 | 30 | 300 | |
| 17th. | | 1,900 | 30 | 300 | |
| 18th. | | 2,000 | 30 | 300 | |
| 19th. | | 2,050 | 30 | 300 | |
| 20th. | | 2,100 (2,150)* | 30 | 300 | |
| 21st. | | 2,150 (2,200)* | 30 | 300 | |
| 22nd. | | 2,200 (2,350)* | 30 | 300 | |
| 23rd. | | 2,250 (2,400)* | 30 | 300 | |
| 24th. and over | | 2,250 (2,500)* | 30 | 300 | |

* For Collectors in Madras only. Sub-Collectors, 1st grade, Madras, draw pay on the Superior Time-Scale subject to a maximum basic pay of Rs. 1,800.

## APPENDIX II.

## INDIAN POLICE SERVICE

### Sanctioned strength on 1st January 1924...782.

**Simultaneous I. P. S. Examination.**

A competitive examination for admission to the Indian (Imperial) Police Force is held both in England and in India. Rules are obtainable from the India Office, London, or from the Chief Secretary to a local Government in India. The examination in India which is held in or about November, is conducted by the Government of India and is confined to candidates selected by a Selection Committee from among those nominated by District Officers. Successful candidates are appointed as Assistant Superintendents. The examination is not so searching as in the I.C.S., the standard being generally that of an Intermediate Examination of an Indian University.

*Scale of Pay per mensem.*

| | Basic pay | | Overseas pay (admissible to officers of non-Asiatic domicile). | |
|---|---|---|---|---|
| Year of service. | Junior. | Senior. | If drawn in sterling. | If drawn in rupees. |
| 1 | 2 | 3 | 4 | 5 |
| | Rs. | Rs. | £ | Rs. |
| 1st | 350 | ... | ... | 100 |
| 2nd | 375 | ... | ... | 100 |
| 3rd | 400 | ... | ... | 100 |
| 4th | 425 | ... | ... | 125 |
| 5th | 450 | ... | 15 | 150 |

* *Officers recruited at the competitive examinations held in the United Kingdom count service for increments of pay*

*Scale of Pay per mensem*—contd.

| Year of service. | Bssic pay | | Overseas pay (admissible to officers of non-Asiatic domicile). | |
|---|---|---|---|---|
| | Junior. | Senior. | If drawn in sterling. | If drawn in rupees. |
| 1 | 2 | 3 | 4 | 5 |
| | Rs. | Rs. | £ | Rs. |
| 6th | 475 | 650† | 15 | 150 |
| 7th | 500 | 675 | 15 | 150 |
| 8th | 525 | 700 | 15 | 150 |
| 9th | 550 | 725 | 25 | 250 |
| | | Efficiency bar. | | |
| 10th | 575 | 750 | 25 | 250 |
| 11th | 600 | 800 | 25 | 250 |
| 12th | 625 | 825 | 25 | 250 |
| 13th | 650 | 850 | 25 | 250 |
| 14th | 675 | 900 | 25 | 250 |
| 15th | 700 | 925 | 30 | 300 |
| 16th | ... | 950 | 30 | 300 |
| 17th | ... | 1,000 | 30 | 300 |
| 18th | ... | 1,025 | 30 | 300 |
| | | Efficiency bar. | | |
| 19th | ... | 1,050 | 30 | 300 |
| 20th | ... | 1,075 | 30 | 300 |
| 21st | ... | 1,100 | 30 | 300 |
| 22nd | ... | 1,150 | 30 | 300 |
| 23rd | ... | 1,200 | 30 | 300 |
| 24th | ... | 1,250 | 30 | 300 |
| 25th | ... | 1,300 | 30 | 300 |
| 26th | ... | 1,350 | 30 | 300 |
| Selection grade ... | ... | 1,450 | 30 | 300 |

Pay, Indian Police Service.

*from the date of reporting arrival in India, or from November 1 of the year of appointment whichever is the earlier provided that the officer reports his arrival in India not later than the December 31 of that year. In the case of officers who, for whatever reason, do not report their arrival in India until after December 31, service for increment will count from the date of such report.*

† *In sixth or any earlier year in which officers may come under Senior Scale.*

NOTE.—All officers enter on the "junior scale," but when they attain certain posts of higher responsibility they are classed as coming under the "senior scale" and draw pay thereunder for so long as they hold such posts (whether officiating in them or appointed substantively to them).

**Administrative appointments, Indian Police Service.**

‡ Appointments above the time-scale—

| *Post.* | Pay | Overseas Pay | Total |
|---|---|---|---|
| | Rupees per mensem. | | |
| Selection Grade of Superintendents | 1,450 | 250 | 1,700 |

| | Pay. |
|---|---|
| | Rupees per mensem. |
| Deputy Inspectors-General ... | 1,750—100—2,150 |
| Commissioners of Police, Calcutta and Bombay ... ... | 2,000—100—2,500 |
| Commissioner of Police, Rangoon... | 1,850—100—2,150 |

§ Inspectors-General of Police—

| | Rupees per mensem. |
|---|---|
| Madras, Bombay, Bengal, United Provinces, Punjab, Burma, Bihar and Orissa ... ... | 2,500—125—3,000 |
| Central Provinces ... ... | 2,250—125—2,750 |
| Assam ... ... ... | 2,250—125—2,500 |
| North-West Frontier Provinces ... | 2,250—125—2,500 |

‡ *The number of appointments above the time-scale held by officers of the Indian Police Service will not exceed ten per cent. of cadre of each province.*

§ *These appointments are not set apart exclusively for members of the Police Department, and the Government reserves discretion to fill them by the selections of any officers who are considered best fitted for them, whether in the department or outside it.*

## APPENDIX III.

### INDIAN FOREST DEPARTMENT.

In connection with the Indian Forest Department there was an excellent editorial in the 8th December 1925 issue of the *Statesman*, which will be of particular interest when Lord Irwin assumes Viceroyalty of India. The editorial writes :—

### Forest Conservation.

Mr. Edward Wood's nomination to the Viceroyalty has prompted Professor E. P. Stebbing of Edinburgh University to write to the *Times* recalling the debt of gratitude which India owes to his grandfather Sir Charles Wood, the joint creator with Sir Dietrich Brandis of the Indian Forest Department. Mr. Stebbing claims that Sir Charles Wood, who was Secretary of State when the Imperial Forest Department was inaugurated, had at least as much to do with its establishment as the Government of India. He quotes from a despatch by Sir Charles written in 1863 in the capacity of Secretary of State—a document proving that more than sixty years ago the head of the India Office had a just appreciation of the vast importance of India's forest reserves and of the necessity for arresting the process of reckless denudation which was even then in full blast. "Most

**India's debt of gratitude to Sir Charles Wood.**

countries in the world," writes Sir Charles Wood, have suffered from similar neglect; and the results have shown themselves not only in the dearth and consequent high price of timber, but very often in the deterioration of climate and in the barrenness of land formerly cultivable if not fertile at the base of hills, when these have been stripped of the forests which clothed them, condensed the vapours into rain and gave protection to the country below them." The Secretary of State added that it required the stability of a settled administration to prevent the existing destruction of forests and hand them down in such quantities and conditions as to leave a supply for future generations. He therefore approved of the Governor-General's proposal to found a seperate department at Calcutta for all questions relating to forests. While the new department was taking shape during the next three years Sir Charles Wood, we are told, "displayed a wonderful insight into matters pertaining to a general forest policy and this at a time when a knowledge of forestry and forestry science was a dead letter in England." Mr. Stebbing points out that in these discussions the Goverment of India had the benefit of the expert advice of Sir Dietrich Brandis, but who was there in London at Sir Charles Wood's elbow? Apparently nobody; and hence the ripe knowledge which he displayed in his despatches on the subject must be credited to his own painstaking research.

**Sir Charles Wood's wonderful insight.**

The Indian Forest Department was the first of its kind in the Empire, and some idea of what India owes to its work during the past sixty years may be gained by a reference to the wholesale destruction of timber which has gone on in such favoured countries as the United States and Canada during the same period. The United States have succeeded in reducing their total area of virgin forest from approximately 820,000,000 acres to less than 140,000,000 acres, while it is estimated that in Canada the commerical timber has been cut or burned in 60 per cent of the forest land. The exploitation of virgin forests is, of course, as Lord Lovat has recently pointed out, a perfectly legitimate process, but the United States and many parts of the British Empire apart from India have been guilty of a prodigal neglect of re-afforestation, with the result that timber scarcity is advancing upon them with seven-league strides. And all this time the Indian Forest Department, in the teeth of passive obstruction at headquarters and active opposition from the people involved, has been so regulating, conserving and renewing the forest wealth of this country that an envious American writer has been constrained to admit that its timber resources have by comparison with other countries "hardly been "touched." The resulting advantages have been twofold. In the first place India has been safeguarded against a timber famine, the prospect of which is causing so much apprehension

**Forest wealth of India.**

**Far-reaching effect of India's forest conservation.**

in the United States; and in the second place she can contribute to the steadying of prices by providing an alternative source of supply to the Empire. For example, Mr. A. L. Howard was able to point out last year that Burma mahogany, though offering just as good value as that obtained in Honduras, cost little more than half as much. In course of time its price will doubtless tend to approximate to that of its rival, but while its excellent qualities remain largely unknown it provides a wonderfully cheap and useful alternative. It is by the way a commentary upon the neglect of Empire resources that in 1920 Great Britain spent nearly ninety millions sterling on imports of timber; but of this vast sum less than £45,000 came to India for timber other than teak.

## INDIAN FOREST SERVICE

### (Monthly rates of pay).

Sanctioned strength ... 353 Pay.

| | | |
|---|---|---|
| One | Inspector General of Forests ... | Rs. 3,250 p. m. |
| One | Assistant Inspector General of Forests ... | Commencing at Rs. 2,500 and rising by annual increments of Rs. 125 to Rs. 2,750 a month. |
| Six | Chief Conservators (Bombay, Madras, United Provinces, Punjab, Burma, and Central Provinces). | |
| One | President, Forest Research Institute and College ... | Rs. 2,500 a month. |
| 36 | Conservators ... | Rs. 1,750—100—2150. |
| 308 | Deputy and Assistant Conservators ... | Rs 325—50—725 (9th year) Efficiency bar here until declared fit by local Government to hold one of the heaviest major charges in the province in which an officer is serving. |
| 353 | | |

Cadre, pay and recruitment.

**Recruitment**

| | |
|---|---|
| (*a*) by promotion from the Provincial service ... | Rs. 800—50—900 (12th and 13th years). |
| (*b*) by selection, in India, of Indian probationers with necessary educational and physical qualifications who will be required to proceed to England to undergo a course of training in Forestry. Candidates of European or Anglo-Indian descent must be unmarried and remain unmarried until return to India on completion of the prescribed course of training. The period of probation is ordinarily two years ... | Rs. 900—50—1,350 (22nd year). Overseas pay as in the case of I.C.S., officers and admissible to members of non-Asiatic domicile. |

Regulations, Indian Forest Service.

GENERAL REMARKS.—Probationers for the Indian Forest Service are required to leave for England early in September and are provided with a free second class passage to England. On completion of training and on being pronounced fit probationers are appointed to the Indian Forest Service as Assistant Conservators and are provided with a free first class passage to India. Their position is determined according to the results of a final competitive examination and on the report of the Director of Indian Forest Studies. While in England each probationer receives an allowance of £350 per annum, not exceeding a total of £700.

*Qualifications for selection as probationers.*

Applicants, who should not be more than 23, nor less than 19 years of age on 30th June, must possess an Honours, or a first class, degree in Science or M. Sc. degree of any class of a University incorporated by law in India or the qualifications required of candidates applying for appointment in England.

Applications accompanied by a preliminary medical certificate of fitness for service in the Forest Department signed by a Presidency, Civil or Agency Surgeon, should be addressed to the Secretary to the Government of India Department of Education, Health and Lands and forwarded through the applicant's Local Government in time to reach the Government of India not later than the 1st May.

## Application Form for Probationership for the Imperial Forest Service.

1. Name in full.
2. Postal and telegraphic address *in full*
3. Exact date of birth and age last birthday.
4. Place of birth.
5. Nationality at birth.
6. Father's place of birth and nationality at birth.
7. His postal address and profession (if dead, give last address).
8. Mother's place of birth and nationality at birth.
9. Schools where educated, with dates of entering and leaving.
10. Name College, College Tutor and University with dates of entering and leaving. State degree (specifying division) and any other distinctions.
11. Any time since entering school not otherwise accounted for should be accounted for here.
12. State if on any former occasion endeavour was made to enter Government Service. If so, when and for what appointment. Give reasons for rejection.
13. State if free from pecuniary embarrassments.
14. Names and postal addresses of the Principal of the College and of two other independent references.

15. Name subject or subjects of special proficiency.

16. State whether the Universities of Oxford, Cambridge or Edinburgh would be preferred for undergoing training in the event of selection.

Signature and date.

(Copies of rules and application forms obtainable from Secretary to Government of India, Department of Education, Health and Lands, from Revenue Secretaries to local Govts. and from Political Officers of Indian States.

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## APPENDIX IV.

### (A) Indian Audit and Accounts Service

| | Cadre and Pay. | Recruitment. |
|---|---|---|
| **Superior Civil Accounts.** | Indian Audit and Accounts Service (Civil).<br><br>Sanctioned strength 183<br><br>(Monthly rates of pay)<br><br>Rs.<br>Auditor-General (one) ... 5,000 p m.<br><br>Accountants-General (14).<br><br>**A** (reserved for members of the I.C.S.)<br><br>(*a*) Class I (1) 3,000<br>(*b*) „ II (2) 2,250-100-2,750 | For posts reserved for members of the I.C.S., selection is made by the Government of India from among such members in any Province. Recruitments for other posts are made (1) by examination in India of which particulars will be found under the "Remarks", (2) by promotion from among the ranks of Assistant Accounts officers, Assistant Audit officers, or Assistant Currency officers, or from those of Superintendents in the Government of India Finance Department Secretariat and, in exceptional cases, also from Superintendents in offices of Accountants-General. |

## (A) Indian Audit and Accounts Service—*contd.*

**Cadre and Pay.**

B (not reserved for I. C. S. officers.)

(*a*) Class I (3) 3,000

(*b*) „ II (8) 2,250-100-2,750

(*c*) Special appt. (Chief Auditor O. & R. Ry.) (1) 2,000-60-2,300

Account and Audit officers Class I (selection grade)

(*a*) Reserved for I.C.S. officers (4) } 1,500-60-1,800

(*b*) Others (14) }

Class II

(*a*) General List (124) ... 350-50-1,400

(*b*) P. W. List (26) 300-50-1,250-50-1,500

**Recruitment.**

**Assistant Accounts officers.**

The Assistant Accounts, Audit and Currency officers referred to in page 176, who are subordinate gazetted officers, are recruited generally (1) by promotion from subordinate ranks in the Accounts offices, and, in special circumstances, (2) by direct appointments by the Government of India of specially qualified candidates.

The sanctioned cadre and rates of pay of these Assistant officers who are quite separate from the superior staff, are as follows :—

(*a*) Civil Accounts—

Class I (2) 660-40-900

II (30) } 500-35-850

(5 tempy.) }

III (1) 250-15-400

(*b*) P.W. Accounts. (7) 500-30-800

(*c*) Railway Audit (11) ... 500-30 800

(*d*) Currency Dpt.

(I) Personal Asst. to Controller of Currency. 500-35-850

(II) Asst. Currency officers (10) ... 500-35-850

The Indian Audit and Accounts Service is now almost entirely on an Indian basis and, combined with the superior staff of military accounts, the service offers for Indian talents a field next best to the I. C. S.

## APPENDIX IV—(*contd.*)

### (B) Superior Staff of the Military Accounts Department

**Cadre and Pay.**

Superior Staff, Military Accounts Department.

Cadre and pay.

Sanctioned strength ... 60

(Monthly rates of pay)

| | | Rs. |
|---|---|---|
| 1 | Military Accountant General ... | 2,750 |
| 4 | Command Controlers of Mily. Accts | 2,250 |
| 6 | Appointments in Class I (selection grade) ... | 1,500-60-1,800 |
| 49 | Appointments in Class II ... | 350-50-1,400 |
| 60 | with efficiency bar at | Rs. 1,000 |

Overseas pay varying from Rs. 150 to Rs. 300 p.m admissible to European civilian officers of Class I & II only.

**Recruitment.**

Recruitment in England of officers for superior staff of the Department is discontinued except in special cases and vacancies are ordinarily filled by direct appointment of Indians and by promotion of members of the Subordinate Accounts Service. Assistant Financial Advisers, Military Finance, and Superintendents in Military Financeare also eligible for promotion to Superior Staff. Acceptance of appointment thereto involves liability for service in any part of India as well as for field service in and out of India.

In addition to the above-mentioned 60 superior appointments which are made by the Secretary of State for India, there are 90 subordinate gazetted appointments of Deputy Assistant Controllers in the grade of Rs. 550-30-850 made by the Government of India by selection of departmental subordinates.

GENERAL REMARKS—Rules for the examination of candidates, in India, for admission to the Indian Audit and Accounts Service also apply to the direct appointment of Indians to the Superior Staff of the Military Accounts Department.

Examination rules.

Statutory natives of India possessed of high educational qualifications, especially in Mathematics, are allowed to compete, a register of candidates being kept from which not less than three candidates for each vacancy are nominated by the Government of India from time to time as vacancies are expected On, or before, the 1st of May in each year local governments send to the Government of India the names of any persons whom they desire to recommend for entry in the register. On 1st August of the year in which an examination is held, the date, place and the conditions whereof are duly notified in the Gazette of India, a candidate must not be less than 22 or more than 25 years of age. A candidate who has been continuously in Government employ since before the age of 25, may, at the discretion of the Government of India, be allowed to compete up to the age 30. The subjects for examination are (1) Writing and Composition and (2) any two of (*a*) Political Economy and Economic History, (*b*) Mathematics (pure and mixed), (*c*) Physics, (*d*) Chemistry, (*e*) History. In the optional subjects the papers set will be approximately of the standard required for the B.A. Honours degree of an Indian University.

## Procedure for submitting applications for entry in the registry referred to under "Remarks."

Register of candidates.

1. The application should be in the candidate's own handwriting and forwarded through the local Government of the province in which the candidate resides.

2. The applicant should pay a fee of Rs. 5 into a Government Treasury and enclose the treasury receipt with his application.

The following particulars are necessary :—

(*a*) A duly verified statement of age.

(*b*) Copies of certificates of character and education.

(*c*) A statement, duly supported, showing the mathematical reading which the candidate has done, and the examinations involving mathematics which he has passed.

(*d*) Information regarding any services that may have been rendered to the State by his parents or family.

(*e*) A statement of the two optional subjects (vide (*a*) to (*e*) in the preceding "Remarks") in which the candidate will, if nominated, offer himself for examination. This statement is not allowed to be modified after the date and conditions of the examination have been published in the Gazette.

## APPENDIX V.

### INDIAN MEDICAL SERVICE.

**Constitution, Indian Medical Servic.**

The Indian Medical Service is essentially a military service maintained to meet the requirements of the Indian army in the first instance and only lends its officers to the civil department subject to their recall to military duty on emergency arising. Two years' military duty on appointment is compulsory before any I. M. S. officer can be considered eligible for civil employment The open competitive examination for the I. M. S. recruitment, which used to be held half-yearly in London in January and July, has been suspended since July 1915 owing to the war and special recruitment by selection substituted until the examination system is resumed. The abnormal demand for medical officers during the war and the subsequent recommendation of the Lee Commission for the abolition of the I. M S introduced so many uncertainties that it was not possible to recruit officers except for military duty. It has lately been decided to maintain the original character of the I. M. S. as a military service, but questions as to how far its officers will be in civil employ to form the war reserve, what the status and ermuneration of officers should be, how the service be wholly composed, that is to say, how many officers should

**Suspension of competitive examination.**

be European and how many Indian and whether the examination, on resumption, should be simultaneous in England and in India, are still under consideration.

**Strength.**

The strength of the I. M. S., as it stood *in January*, 1925, was 432 (military) and 424 (civil). The principal civil appointments open to the I. M. S. at present, together with the salaries attached to each, are stated in the following table :—

**Civil appointments.**

| Description of Appointment. | Approximate number of appts. in each class. | Salary per mensem. |
|---|---|---|
| | | Rs. |
| Heads of Provincial Administration ... | 8 | 2,750<br>3,000 Bombay, Madras and Bengal. |
| Sanitary Commissioner with Government of India ... | 1 | 2,500-3,000. (irrespective of rank.) |
| Inspectors-General of Prisons ... | 8 | 2,300-2,500. (irrespective of rank.) |
| Sanitary Commissioners with Provincial Governments ... | 8 | 2,100-2,400. (irrespective of rank.) |
| Professorial and Bacteriological Appointments ... | 63 | Pay of rank + Rs. 250 p. m. |
| Plague Officers ... | 20 | ,, + Rs. 250 p. m. |
| Superintendents of Central Jails ... | 29 | ,, + Rs. 150 p. m. for 1st class jails or Rs. 50 p. m. for 2nd class Jails. |
| Civil Surgeoncies ... | 216 | Pay of rank. |

The numbers are only temporary and are liable to revision.

## Special Recruitment.

1. A small number of medical men of European descent are to be appointed in the near future to permanent commissions in the Indian Medical Service, on the special terms set out below.

2. Candidates must be well-qualified medical practitioners over 21 and under 32 years of age.

3. Appointment will be by nomination on the recommendation of a Selection Committee, before whom candidates will have to appear in person. Rules, special recruitment.

4. The special terms are as follows. On completing five years' active service in India, an officer so appointed may claim to retire on a gratuity of 1,000£., provided he has given notice to retire 12 months before the expiry of the five years. If he does not do so, he will continue in the service on the ordinary pensionable footing. An officer so retiring will be entitled to free passage for himself and his family to the United Kingdom or to any port in the British Empire to which he may wish to proceed. These passages must be claimed within three months of retirement. Employment in the Military Branch of the Service is guaranteed for the initial five years, so that officers will not be affected by the constitutional changes resulting from the Reforms of 1919 In addition to actual service only privilege leave (*i. e.*, leave on full pay for 60 days in each year) will be allowed to count towards the period of five years required for the gratuity, and not ordinary furlough or sick leave.

5. In view of the recommendations as to the future of the Indian Medical Service contained in the Report of the Lee Commission, which is now under consideration, only military employment can be guaranteed to officers entering the Indian Medical Service at the present time. They will, however, be eligible for the benefits of any conditions regarding civil employment which may be made applicable to officers in future appointed to the Military Medical Service in India, as the result of decisions taken on the Lee Commission Report.

6. In all other respects the ordinary rules and conditions, as set forth in Regulations for the Appointment of Candidates to Commissions in His Majesty's Indian Medical Service, will apply.

7. The officers appointed will sail for India not later than next March. It is hoped to arrange for them to attend a course of instruction before doing so.

8. Application forms and any further particulars desired may be obtained from the Secretary, Military Department, India Office, Whitehall, S. W. 1. Envelopes should be marked "Medical Recruitment".

India Office,
*December 1924.*

## Officers of the Superior Medical Services in India.

*(Monthly rates of pay)*

Pay of I. M. S. and R. A. M. C.

| I. M. S. officers in civil and military employ. | | | R. A. M. C. officers on duty with British troops in India. | |
|---|---|---|---|---|
| **I. M. S (Civil) & (Mily.)** | Rs. | These rates of pay are exclusive of charge allowances and Second-in-Command allowances for Station Hospitals on the military side and of various allowances attached to posts on the civil side. | | Rs. |
| Lieut. | 500 | | Lieut | 650 |
| Captain | 650 | | Captain | 800 |
| „ after 6 years | 750 | | Captain after 6 years ... | 900 |
| „ after 10 years | 850 | | Captain after 10 years ... | 950 |
| Major | 950 | | Major ... | 1,100 |
| „ after 15 years | 1,100 | | „ after 15 years | 1,250 |
| „ after 18 years | 1,250 | | „ after 18 years | 1,400 |
| Lt.-Colonel below 24 years... | 1,500 | Indian officers will draw pay in accordance with the basic scale set-forth herein, without overseas allowance. | Lt.-Colonel ... | 1,550 |
| „ during 24 & 25 | 1,600 | | „ after 20 years | 1,650 |
| after 25... | 1,700 | | „ after 25 years | 1,850 |
| (Selected) ... | 1,850 | | | |
| Overseas pay as in the I. C. S. ... | | | | |

The R.A.M.C. is an entirely British Service and recruitments therefor are made by the War Office, London.

### General Remarks.

The principal administrative appointments are held by Colonels and Major-Generals. The principal civil appointments are already shown in

p. The head of the I. M. S. and other administrative appointments (mily:) are allowed the following consolidated salaries :—

**Administrative medical appointments.**

| | |
|---|---|
| The Director-General, I.M.S ... | Rs. 3,500 p.m. |
| Director, Medical Services (Lieut-General or Major-General) ... | „ 3,200 „ |
| Deputy Director, Medical Services, Command Major-General ... | „ 2,750 „ |
| Deputy Director, Medical Services, Army Headquarters ... | „ 2,500 „ |
| Director, Army Headquarters. | |
| Assistant Director, Medical Services, District. ... | |
| Assistant Director, Medical Services and Sanitary Adviser, Line of communication ... | |
| Assistant Director, Medical Services on Field Service ... | Rs 2,400 p.m. |
| Assistant Director, Medical Services, Aden Brigade ... | |
| Consulting Dermatologist or other consultant if authorised, of 25 years' service and over ... ... ... | |
| Consulting Dermatologist or other consultant if authorised, of under 25 years' service ... | „ 2,200 „ |
| Inspector of Medical Services, Army Headquarters. | |
| Assistant Director, Medical Services, Army Headquarters | „ 2,150 „ |
| Deputy Assistant Director, Medical Services ... | Pay of rank + Rs. 250 p.m. |

Of the two appointments of Director, Medical Services, and Deputy Director, Medical Services, Army Headquarters, one or the other is held by an officer of the British Service. Similarly the other military medical administrative appointments are equally distributed between the officers of the I. M. S. and of the British Service. I. M. S. officers in military employment up to the rank of Lieutenant-Colonel are further eligible, if qualified, to hold any one of 50 specialists' appointments at Rs. 75 per month extra allowance. Except in the administrative grades and in certain special appointments medical officers are not debarred from taking private practice, so long as it does not interfere with their proper duties.

**Specialist pay.**

At the last Legislative Assembly's debate about recruitment for the I. M. S. Colonel Needham said that during the past 15 years statesmen, doctors and soldiers had sat on several commissions on the Service but no particular result had yet ensued. There is some inherent difficulty in the constitution of the I. M. S. and whatever decision may now be taken, it may not be the last word on the subject. The difficulty was tried to be explained to some extent in a letter published in the 13th February, 1924, issue of the "Statesman." The letter is as follows:—

## The Indian Medical Service.

To The Editor of the "Statesman"

SIR,—Looking into the evidence given before the Lee Commission one feels inclined to think that the problem of the I. M. S. presents some special difficulties. The evidence of Sir Nilratan Sarkar is just as straightforward a statement of the point of view as may be expected from an independent medical practitioner of his position and experience. The other witnesses more or less defend the present character of the I. M. S. as constituting a war reserve. But considering the large number of members of the independent medical profession who volunteered for active service during the last war, one would conclude that the plea of war reserve could not stand unless there were other strong reasons for the retention of the I. M. S. as essentially a European service.

**Inherent difficulties in the constitution of the I. M. S.**

**War reserve.**

By way of a little digression from the main question it may be mentioned that besides the I. M. S. there are four other medical services in India, namely, (1) the R. A. M. C. for duty with British troops, (2) the I. M. D. consisting of (*a*) Anglo-Indian military assistant surgeons and (*b*) Indian military sub-assistant surgeons, (3) Provincial Civil Medical Service (civil assistant surgeons and (4) Subordinate Medical Service (civil sub-assistant surgeons). The organisation is so complex

that one should not be surprised if it proved prejudicial to progress and economy. As an instance it may be mentioned that the recent reduction of British troops in India necessitating the automatic discharge of a number of military assistant surgeons was used as a handle the other day for declaiming against the most considerate action of Government. Another economy which may be carried out is the abolition of the office of the Director-General, Indian Medical Service, there being no such intermediate department either for the I. C. S. or the Police.

Coming to the I. M S. generally, it may be argued that as a military service the I. M. S provides certain advantages which are not otherwise obtainable, and that in selecting officers for special scientific and administrative appointments, it is easier, safer and more economical to do so from among the members of a large service of over 700 officers employed on various duties than by engaging outsiders on special terms. No doubt there is a good deal of force in those arguments. But it appears to be more advisable and business-like to meet special needs by special recruitments than to allow a service to grow and to create recruitment difficulties as represented in the recent statement of I. M. S. officers to the Royal Commission. So far as military training is concerned, it may perhaps be provided by a simple arrangement of temporary exchanges between officers of military and civil

sides on the same principle as applies to exchanges between R. A. M. C. and I. M. S. officers.

**Medical attendance by European doctors.**

Finally there is another aspect of the case. It is now being freely mentioned that European officers and families are entitled to medical attendance from European doctors. This is a very reasonable communal feeling, indeed, although apparently unsupported by any rule or contract, and should be provided for as far as possible. But necessary European recruits for the service do not appear to be forthcoming even on the pay and prospects which have been largely improved during the last 20 years. While in England in 1910-12 I made personal inquiries as to the popularity of the I. M. S. with British medical students, and I was informed that they did not generally care for the I. M. S., there being better prospects at home. Further, the growth of an independent medical profession in India has absorbed a large amount of private practice which would otherwise have gone to the I. M. S. and the recent transfer of medical administration to the control of Indian Ministers is perhaps another cause of unpopularity. In these circumstances it appears to be hopeless to attract European recruits in sufficient number by offer of any further increases of pay consistent with the financial ability of India. The only alternative seems to remove all racial qualification for admission into the I. M. S. and to retain it as an Imperial service for civil duty only by recruitment in Eng-

land as at present instead of merging it in the Provincial Medical Service.—Yours, etc.,

J. C. GHOSH,

Principal, School of Chemical Technology.

Calcutta, February 11.

Dual character of the I. M. S.

It is apparent that the I. M. S. difficulty is largely due to its dual character to serve both the military and civil interests and that it may be simplified by handing over the military responsibility to the R. A. M. C. as in the United Kingdom while retaining the liability of civil officers to return to military duty when necessary and allowing them military rank under present rules. The I. M. S has derived its professional glory from the civil side, India, with its variety of climate, diseases and people's habits, presenting a vast field for medical research, and if the present system of recruitment in England with consequent British training is left undisturbed, the service will continue to attract the best talents, whether British or Indian, who may care more for opportunities for scientific work than for money.

Better *espirit de corps* among members of the medical profession may perhaps be induced by (1) abolishing distinctions of assistant surgeons and sub-assistant surgeons, (2) classing all grades as registered medical practitioners under one unified Indian Medical Council and (3) declaring all of them eligible for competing for the I. M. S. This arrangement may minsimise the difficulties now

experienced in meeting the civil and military medical needs of India.

In connection with Superior Medical Services in India mention may be made of the humane services rendered by members of the Nursing Service which is associated with the name of the late lamented Queen Mother who endeared herself to the people by her numerous benevolent work. This service which was previously known as the Indian Nursing Service and designated since 1903 as Queen Alexandra's Military Nursing Service for India, consists of one Chief Lady Superintendent, 4 Lady Superintendents, 16 Senior Nursing Sisters and 18 Nursing Sisters employed in British Military Hospitals on rates of pay and allowances shown below. The service is composed entirely of ladies of good social position, who are appointed by the Secretary of State for India and who are engaged first for a period of five years with option to renew their engagement for further periods qualifying for gratuity or pension as the case may be on termination of engagement.

## Queen Alexandra's Military Nursing Service for India.

(*Monthly rates of pay*)

| | Rs. | |
|---|---|---|
| Chief Lady Superintendent at A.H.Q. ... | 650+ Rs. 100 p.m. as charge pay. | Cadre and pay. |
| Lady Superintendent ... ... ... | 450 | |
| Lady Superintendent if not provided with free quarters, furniture, etc. ... ... | 520 | |
| Senior Nursing Sisters after 5 years' service in that grade ... ... ... | 350 | |
| Senior Nursing Sisters after 5 year's service on promotion to that grade ... ... | 325 | |
| Nursing Sister after 11 years ... ... | 300 | |
| Nursing Sister after 5 years ... ... | 275 | |
| Nursing Sister on appointment ... ... | 250 | |

Charge pay ranging from Rs. 20 to Rs. 40 p.m. in addition is admissible according to the number of Nursing Sisters under charge.

**Lady Reading's splendid services.**

The example set by the Q.A.M.N.S.I., has given rise to Institutions and Associations in India for providing medical aid by women for both men and women in India and these institutions, in addition to being humanitarian in character and consequently endowed with power to stimulate social service work, open new careers for Indian women and this country will always remember with gratitude the splendid services rendered by Lady Reading and previous Vicerenes in this connection. About a quarter of a century ago the writer, in his paper on "The Education that India needs", suggested the creation of trained nurses' associations and the training therein of

Indian women desirous of careers, and of widows particularly.

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## APPENDIX VI.

### INDIAN EDUCATIONAL SERVICE

**I. E. S. cadre and pay.**

| Men's Branch | Women's Branch |
|---|---|
| Authorised strength ... 377 | Authorised strength ... 41 |
| Pay | Pay |
| **Time-scale** | **Time-scale** |
| Rs. 400 p.m. rising to Rs. 1,250 p.m. in the 20th year. | Rs. 400 p.m. rising to Rs. 850 p.m. in the 19th year and after. |
| Overseas pay for officers of non-Asiatic domicile. Rs. 150 p.m. in the first five years, Rs. 250 p.m. in the 6th to 11th year and Rs. 300 p.m. afterwards. | Overseas pay of Rs. 50 p.m. to members of non-Asiatic domicile. |
| Selection Posts for 15 p.c. of of cadre on Rs. 1250-50-1,500. | Selection grade for about 20 p.c. of cadre on 900-25-950-50-1,050 p.m. |
| Selection Posts for 5 p.c. of cadre on Rs. 1,550-100-1,750. | |
| **Recruitment.** | **Recruitment.** |
| By selection in England and in India, all appointments being made by the Secretary of State for India. Candidates must, as a rule, be not less than 23 nor more than 30 years of age. | By selection in England and in India, all appointments being made by the Secretary of State for India. Candidates must, as a rule, be not less than 23 nor more than 30 years of age. |

### GENERAL REMARKS.

**Provincialisation of I. E. S.**

It has been decided to provincialise the Indian Educational Service and it will rest entirely with

the local governments to determine the number of Europeans who may in future be recruited. In this matter the discretion of local governments will be unfettered. In practical effect Ministers, on the one hand, will still seek to obtain the co-operation of Europeans, and qualified Europeans, on the other hand, may be no less willing to take service under local governments than they were, in the past, to take service under the Secretary of State.

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## APPENDIX VII.

### Indian Ecclesiastical Establishment

Sanctioned strength ... 156.

| Church of England. | Church of Scotland. | |
|---|---|---|
| **Pay.** | **Pay.** | Cadre, pay, etc. |
| Rs. 600-25-800-50-1,250 p.m. in the 18th year. First increment to Rs. 625 allowed on attaining 28 years of age. Rs. 1,300 in the 19th year and thereafter. | Rs. 600-25-800-50-1250 p.m. in the 18th year. First increment to Rs. 625 allowed on attaining 28 years of age. Rs. 1,300 in the 19th year and thereafter. | |
| **Recruitment.** | **Recruitment.** | |
| By selection by the Secretary of State for India, according as vacancies occur, from among candidates who have been 3 years altogether in Holy Orders and are between the ages of 27 and 34 years and who are recommended by the Indian Chaplaincies Board of the Church of England to whom applications for nominations should be submitted. | By selection by the Secretary of State for Indus according as vacancies occar from among candidate who must have been licensed for 3 years and be under 34 years of age and who are recommended by the General Assembly's Committee on Indian Churches to whom applications for nominations should be submitted. | |

| | Pension on M. C. | Pension on M. C. |
|---|---|---|
| Pension. | After 10 year's residence in India...£160 a year with an addition of £30 for each year and rising to £430 a year after 19 years. | After 10 year's residence in India...£160 a year with an addition of £30 for each year and rising to £430 a year after 19 years. |
| | **Retiring Pension.** | **Retiring Pension.** |
| | After 20 years' residence and 23 years' service . £480. | After 20 year's residence and 23 years' service...£480. |

GENERAL REMARKS.—Candidates who at the time of their application are working in India, should, while applying to the Board in England, forward a letter of recommendation from the Bishop of the Diocese in which they are working. A selected candidate is appointed on probation for 2 years and is confirmed as a Junior Chaplain if reported qualified and medically fit at the end of probation.

Rules for admission, etc.

Service for leave and pension counts from the date of arrival at the station to which appointed or at its headquarters.

Time spent in India on service under an Additional Clergy Society or on other approved service, counts for increments of pay up to a maximum of 2 years.

A Chaplain may be permitted to resign his appointment after 5 years' service subject to a six months previous notice and receives a bonus of £400 as well as a free return passage if his service has been satisfactory.

The Indian Ecclesiastical Department is a purely British Service and in most respects an Army Service. Copies of rules and application

forms are obtainable from the India Office, Judicial and Public Department, London.

## APPENDIX VIII.

### Indian Agricultural Service

A new impetus.

As a result of the pronouncements recently made by the Right Hon'ble the Secretary of State for India and His Excellency the Viceroy it is expected that greater interest than heretofore will be shown in Indian agriculture in the near future and greater public attention paid to the Indian Agricultural Service, thereby leading us to a new era of Indian agricultural development which would in course of time place agriculture in India on the same level as it is now in Europe and America.

Inception of scientific agriculture.

As mentioned in a preceding chapter, pp. 51 and 192, it was owing to the late Lord Curzon that scientific agriculture in its modern sense was virtually initiated in India through the endowment of an American millionaire, which resulted in the establishment of the Imperial Agricultural Research Institute at Pusa. A review of the work done there and elsewhere in India is annually published and a rough estimate of the value thereof could be made if any student of Agriculture or Economics would take the trouble to look at the annual crop values in India since 1904.

Statistics.

The accuracy of the statistics furnished in Reviews of Agricultural Operations in India may be challenged, but the Trade Returns which are used

officially for revenue purposes, unmistakeably show what increased income India is deriving from better yields of cotton, coffee, fibres (jute, etc.), oilseeds, rice, rubber, sugarcane, tobacco, wheat and other crops.

**Improved varieties of crop.**

The improved varieties of crops obtained by scientific breeding no doubt increase the yield and quality and knowing what we do about the difference between the long-stapled American and short fibre Indian cotton, it amounts to a matter of simple arithmetic to get at the increased value provided there is an authentic report of the acreage under cultivation with improved seeds. It is for the people to co-operate with Agricultural Department and to help in preparing authentic reports instead of (a) allowing themselves to be obsessed only with ideas of political strife and (b) of leaving the responsible work of agricultural computation apparently to village chowkidars.

**Agricultural Research.**

Apart from scientific breeding, the Indian Agricultural Department conducts a large amonnt of research and investigational work in respect of soils, manures, artificial fertilisers and engineering. These experiments involve a great deal of money and unless the demonstration farms are managed on business lines through the *ryots*, everything being left to them as far as possible, and are made to pay, a portion of the profit only being taken by government, the Agricultural, or for the matter of that, any other scientific department is placed in a false position and is confronted with

critics who suggest that the mint of money spent is a waste and that the department should be abolished. Such criticisms will have to be faced and answered by irrefutable good work. It is reported that the extra profits made in the Punjab alone from the introduction of an improued variety of cotton approximating to the American, amounted to over 2 crores of rupees in 1923-24. It at the lowest computation the profits to the cultivating classes for the whole of India from improved crops amount to 5 crores a year, the expenditure on the Agricultural Department is made up many times over. We are not, however, told what increased expenditure the cultivator has to incur to get his improved crop and how much of the 5 crores is absorbed by the middlemen. It is not an easy job to make agriculture in India paying with hired labour unless and until the crop yield is largely increased by scientific methods. As far as is known agriculture is only barely paying when it is carried on by the *ryot* himself with his *free* labour and that of his family. So long as this remains to be the position, educated classes will hardly be attracted except for paid appointments. Such an arrangement will scarcely improve agriculture until the *ryots* themselves are educated and take advantage of scientific methods under some scheme as explained in p 35. It is feared that sceptics will not be disarmed unless there is a thorough enquiry into the rural conditions in

**Crop Values.**

**Need for further information.**

India and until the improvement claimed is proved to the hilt The matter is one in which the *ryot* himself should have his say and this is hardly possible until general literacy is extended.

For the whole of India there are two Imperial Agricultural Institutes, namely, (1) the Imperial Agricultural Institute at Pusa and (2) the Imperial Institute of Animal Husbandry and Dairying at Bangalore. In addition to these two Institutes which provide facilities for post-graduate courses, there are six provincial colleges at Poona (Bombay), Coimbatore (Madras), Lyallpur (Punjab), Cawnpore (U. P.), Nagpur (C. P.) and Mandalay (Burma), of which the first three are affiliated to Universities. The three eastern provinces of Bengal, Bihar and Orissa, and Assam, with a united population of 90 millions, are the only ones without an institution imparting higher education in Agriculture, the college at Sabour (Bihar) having been closed down owing to there bring no demand for higher agricultural education among the people of the provinces.

**Agricultural Institutions.**

The Agricultural Research Institute at Pusa offers *post-graduate* courses in Agricultural Chemistry, Botany, Mycology, Agricultural Bacteriology and Entomology, each extending over 2 years and qualifying for appointments in the Indian Agricultural Service. The Imperial Institute of Animal Husbandy and Dairying at Bangalore provides a fifteen-months' *post-graduate* course qualifying for posts of Deputy Director of Agriculture and Profes-

**Post-graduate course at Pusa and elsewhere.**

sors of Agriculture. The Institute also grants an Indian Diploma on the lines of the British National Diploma in Daiying. This diploma is a two years' course open to matriculates. The Allahabad Agricultural Institute of the American Presbyterian Mission is the only other institution recognised for training students for this diploma course.

The kind of agricultural education referred to above will not reach the *ryot* unless scientific agriculture is brought to his very door and demonstrated before his eyes. Facilities which already exist for admission of Indians to the Indian Agricultural Service, may be made more widely known and the Agricultural and other scientific departments should extend their arms to receive trained Indians more freely instead of resenting their admission and of remaning top-heavy as happens to be the complaint in some quarters. These qualified Indians will be in a better position than Europeans to speak direct to the *ryot* and to convince him of the usefulness of scientific agriculture Further, a host of agricultural *gurus* according to the scheme explained in chapter II, p 35, appear to be necessary to live with the *ryot* and to teach him, thereby creating an *impetus* for agricultural education among the agricultural *labouring classes* and inducing them to receive the highest traning, if possible, not with a view to holding appointments, but for applying the knowledge direct to their profession.

**Extension o agricultural education**

## Indian Agricultural Service

Sanctioned strength 155

Appointments include those of Deputy Director of Agriculture, Agricultural Chemist, Economic Botanist, Mycologist, Entomologist and Bacteriologist.

**Cadre, pay, etc.**

The majority of officers of the Indian Agricultural Service are borne on provincial cadres of the several provinces of India, a comparatively small staff being included in the Imperial Department of Agriculture under the direct control of the Government of India.

### Recruitment.

Appointments are made by the Secretary of State for India. Candidates must ordinarily be not less than 23 nor more than 30 years of age. Preference is given to distinguished graduates of British Universities: Special qualifications, namely, (*a*) University distinctions, (*b*) practical experience of farming, (*c*) research experience under a scientist of established reputation, are called for according to the nature of the post to be filled up and the age limit is relaxed in these cases.

| Pay. | Rs. |
|---|---|
| Agricultural Adviser to the Government of India (sometimes held by an I C.S officer.) | 2,750 p.m. + a rent free house at Pusa. |

Heads of Sections at Pusa and of other permanent posts in those sections carry local (or Pusa) allowances of Rs 150 p m. or more up to Rs. 400.

| | |
|---|---|
| Officers on the selection grade calculated at 15 p.c. of the Imperial Service officer on the provincial cadres. Selection made in consideration of merit only on completion of 15 years' service. | 1550-50-1800 inclusive of an overseas pay of Rs. 300 p. m. |
| Officers below the selection grade from 1st to 21st year and onwards. | 500-50-1,550 inclusive of an overseas allowance of Rs 150 p.m. from 1st to 5th year, of Rs. 250 from 6th to 11th year and of Rs. 300 thereafter. Efficiency bar at Rs. 900. |
| Overseas pay admissible to officers of non-Asiatic domicile. Annual increment of Rs. 50 except at the 6th and 12th years. | |

## APPENDIX IX.

### Indian Veterinary Service

Improving the cattle.

The Indian Veterinary Service is closely allied to the Indian Agricultural Service and the same care and facilities which are necessary for the improvement of the soil are equally called for in respect of improving the cattle. The impetus which is expected in regard to agricultural development in India will remain incomplete unless it is extended to the Veterinary Department as well and improvements effected in these two departments—departments wherein the health, wealth and happiness of India vitally lay in olden days and still lie to a large extent—will materially better the conditions of Indian peasants and of India generally. Any scheme or schemes which may be devised to improve the crop and the cattle of India are, therefore, of great importance to the masses and the *intelligentsia* alike and their co-operation is apparently essential to make the scheme a success.

Two mainstays of India.

Co-operation of people essential.

Veterinary instruction.

The existing facilities for veterinary training in India are provided by the four Colleges at Madras, Calcutta, Lahore and Bombay and schools at Insein and Taunggyi in Burma. The Imperial Bacteriological Laboratory at Muktesar is doing the same useful work for Veterinary Science as the

Pusa Institute is doing for Agriculture and measures may be adopted for giving wide publicity to the splendid work that is being carried on there as well as in several Agricultural and Veterinay Colleges and Schools throughout India. The people are not generally aware of what is being done and what facilities are available and money spent on publicity will be well spent, conducing to contentment and happiness amongst millions of people. A handbook like the present volume may be a useful College and School textbook and thereby the Indian population will come to know more of what concerns them most and their welfare than in other ways generally. Postgraduate courses at the Muktesar Laboratory may be thrown open to veterinary graduates on the same lines as at Pusa and may be made to qualify freely for appointment to the Imperial Veterinary Service. Suggestions which are made under the Indian Agricultural Service apply *mutatis mutandis* to the Indian Veterinary Service and every step may be taken to popularise agricultural and verterinary work and to make it reach the *ryot*.

**Existing facilities.**

**Value of a handbook.**

**Muktesar Laboratory.**

# APPENDIX IX—(*Contd.*)

## Indian Veterinary Service

| Sanctioned strength ... 54 | Pay. | |
|---|---|---|
| Selection Grade ordinarily limited to 15 p.c. of total strength of the Imperial Service inclusive of posts at the Imperial Bacteriological Laboratory at Muktesar. Promotion to this grade allowed in consideration of merit alone on completion of 15 years' service. | Same as in Indian Agricultural Service for Selection Grade and below.<br><br>Rs. 1550-50-1,800 inclusive of an overseas pay of Rs. 300. Local, house and other allowances are attached to certain appointments. | Cadre, pay, etc. |
| Officers below the selection grade from 1st to 21st year and onwards. | Rs 500-50-900 (8th year) Rs 950 (9th year) to Rs. 1,550 (21st year and thereafter) inclusive of an overseas pay to non-Asiatic domicile as in the Indian Agricultural Service. | |

### Recruitment.

Appointments made by the Secretary of State for India from among candidates ordinarily not over 30 years of age and possessing a diploma from the Royal College of Veterinary Surgeons. Evidence of a knowledge of bacteriology and of capacity for carrying out original research counts in estimating the claims of candidates. Age limit relaxed in special circumstances.

GENERAL REMARKS—Officers of the Agricultural Service are expected to devote their whole time to official duties. But the officers of the Indian Veterinary Service are allowed to undertake private practice unless it interferes with the efficient

performance of official duties which are divided into three classes under the following heads :—

(*a*) Educational work in Veterinary College.

(*b*) Horse and Mule breeding.

(*c*) Cattle disease and cattle breeding.

Officers appointed either to the Agricultural or to the Veterinary Service remain on probation in India for 3 years and are confirmed subject to passing the prescribed linguistic test and satisfactory completion of the probationary period.

# APPENDIX X.

## Indian Geological Survey and Indian Meteorological Service.

Cadre, pay, etc.

| (*a*) Geological Survey of India. | | (*b*) Indian Meteorological Service. |
|---|---|---|
| Sanctioned strength ... 29 | | Sanctioned strength ... 8 |
| **Pay.** | | **Pay.** |
| One Director ... | Rs. 3000 p. m. | Rs. 400-50-1250 p.m with overseas pay when admissible. One selection grade post on Rs. 1250-50-1,500 p.m. with overseas pay when admissible. At present there are three appointments on special rates of pay rising to Rs. 1,500 and overseas pay. |
| Six Superintendents ... | Rs. 1500-100-2000 | |
| Twenty-two Assistant Superintendents and Chemist. | Rs. 400 rising to Rs. 1,200 in the 19th year and after with an overseas pay of Rs 150 200 and 250. | |
| Overseas pay admissible to officers of non-Asiatic domicile | Rs. 150 in the first 4 years, Rs. 200 in the 5th to 7th year and Rs. 250 p.m. afterwards. | |
| | | **Recruitment.** |
| | | There are no special rules for appointment to the Indian Meteorological Service. Recruitment is made from amongst candidates possessing a high degree of proficiency in Physics or Mathematics. |
| **Local allowance of Rs. 150 p.m. for the Palæontologist at headquarters and for the appointment of Museum Curator.** | | |

General rules.

GENERAL REMARKS.—Applications for appointment to the Indian Geological Survey should be made on a printed form to be obtained from the Secretary to the Government of India, Department of Industries and Labour, and should reach the Government of India before the 1st January every year. Preference will be given to candidates with war service. Besides a good general education, a sound education in geology, a University degree and a knowledge of French or German will be regarded as important qualifications. The age of candidates should ordinarily not exceed 25.

First appointments are probationary and, if confirmed, the probationer will count service from the date of appointment. Promotion to the grade of Superintendent will depend on qualifications and merit and on the existence of vacancies in the grade.

# APPENDIX XI.

## The Survey of India Service and a few other branches of Superior Services.

(*a*)
Survey of India Department.
(Authorised strength ... 65)

**Pay.**

Class I.

| | |
|---|---|
| 1. Surveyor General ... | Rs. 3,250 |
| Six Directors ... | Rs. 2200-50-2400. |
| 35 Deputy Superintendents and 23 Asst. Superintendents on time-scale of pay. | Rs. 630 to Rs. 2000 p. m. |

**Recruitment.**

Deputy Superintendents are generally recruited by selection from among officers of the Army. 13 posts in the grade of Deputy Superintendent are allotted to promoted men of Class II which is open to Statutory Indians.

(*b*) Miscellaneous.
Archæological Department.
(Sanctioned strength ... 19) **Cadre, pay, etc.**

Director-General of Archæology.

Deputy Director-General of Archæology and other officers drawing pay from Rs. 350 p.m. to Rs. 1,200 in the 24th year with overseas pay when admissible.

Director, Zoological Survey of India (Sanctd. cadre 9.)

Superintendents, Zoological Survey of India (Rs. 1,000-1,500) **Miscellaneous services.**

Assistant Superintendents, Zoological Survey of India (Rs. 350 to 950.)

Director of Botanical Survey in India.

Librarian, Imperial Library.

Keeper, Imperial Records.

GENERAL REMARKS.—There are no rules for appointment to the Archaeological Department, Zoological Survey and Botanical Survey; or as Librarian, Imperial Library and the Keeper of the

General rules.

Records of the Government of India. Nor is there any Botanical Service.

The terms of service in the Survey of India have not been published, but recruitment to Class I of the Survey Department is made from among officers of the Army, the only exception being the Mathematical Adviser who is a civilian.

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## APPENDIX XII.

### The Bengal Pilot Service

Sanctioned strength:—

| | | | |
|---|---|---|---|
| (*a*) | Leadsmen Apprentices | ... | ... 16 |
| (*b*) | Pilots | ... | ... 58 |

**Pay.**

The Pilots are not entitled to any salary but are remunerated by grant of 50 per cent of the pilotage fees subject to a guaranteed minimum. The rates of pay and allowances of Leadsmen Apprentices are:—

| | Rs. | |
|---|---|---|
| Leadsman Apprentice | ... 200 p.m | *Plus* 50 per cent of lead money collected from ships on which they are on duty. |
| 2nd Mate Leadsman | ... 250 ,, | |
| 1st Mate Leadsman | ... 300 ,, | |
| 1st Mate Leadsman who has passed Mate Pilot's examination | ... 350 ,, | |

Inception of the Bengal Pilot Service.

GENERAL REMARKS.—The Pilot Service at the Calcutta port alone is under Government, the Service at the other principal ports in India being under various Port Trusts. In an address to the Calcutta Ratary Club on the 13th October 1925, Mr. G. T.

Labey, a prominent member of the Bengal Pilot Service, gave a very interesting account of the Service during the 258 years of its existence since 1667 when the Directors of the East India Company built in England the pinnace *Dilligence* of 60 tons and sent her out with a crew for employment on the river Hooghly for a certain number of years, thereby inaugurating the Bengal Pilot Service, the oldest covenanted service in India. No owners of vessels would, in those days, risk their ships in navigating up the river instead of staying at Balasore and after several tragic happenings trained pilots were made available and the service founded. The first batch of apprentices came out in 1668, the second in 1673 and the third in 1678.

## Recruitment.

Appointments to the Bengal Pilot Service are made by the Secretary of State under certain conditions, but preferably by the Bengal Government from among local candidates with 4 years' experience as seamen or apprentices in a merchant vessel employed in a foreign trade and with general educational qualification equivalent to matriculation.

# APPENDIX XIII.

## Indian Service of Engineers

### (1) Posts and Telegraphs.

**Cadre, pay, etc.**

Sanctioned strength ... ... ... 58

**Ranks :—**

A. Divisional and Assistant Divisional Engineers (Details of Pay shown under (2) and (3)

B. Director, Telegraph Engineering (Pay Rs 1750-100-2,150 p.m. with overseas pay of £13-6-8 p.m. payable in sterling)

C. Chief Engineers (Pay Rs. 2750-125-3000 p.m. with overseas pay as above.)

**Recruitment**

**Posts and Telegraphs.**

Candidates for direct appointment in India must in addition to final Engineering qualifications, have a year's practical training in electrical engineering and, on selection, undergo a further year's departmental practical training, receiving a subsistence allowance of Rs. 200 p.m. and drawing pay of an Assistant Divisional Engineer from date of appointment. Only statutory natives of India are eligible for *direct* appointment. Other particulars given in the "Remarks" column and in the form of Application. Candidates recruited in England must produce evidence that they have (a) obtained a degree, diploma, or other equivalent distinction in Electrical Engineering from any University or Institution of University standing in the United kingdom, and (*b*) spent at least one year on practical Electrical Engineering work. After selection, candidates will be required to undergo a further year's practical training in Electrical Engineering on approved works in England. Selected candidates will also be required to satisfy the Secy. of State of their ability to ride and will be on probation for at least one year in India.

### (2) Public Works.

**Cadre, pay, etc., Public Works.**

Sanctioned strength ... ... ... 724
(Superior Engineering Estbt consists of a staff of Engineers, military and civil)

**Ranks :—**

A. Executive Engineers and Assistant Executive Engineers. Details of Pay shown below under 3'.

B. Superintending Engineers. (Pay Rs 1750-100-2150 p.m. with overseas pay of £13-6-8 p.m. payable in sterling).

C. Chief Engineers. (Pay Rs 2750-125-3000 p. m. with overses pay as above)

Pay of officers in rank A. Details shown under (3) and consisting of Basic pay (junior and senior scale applying to officers of rank A only). Overseas pay and passage pay admissible to officers of non-Asiatic domicile. Basic pay includes Rs. 75 p.m. as Technical Allowance admissible to all officers recruited in Europe, whether European or Indian.

### (3) State Railways.

Sanctioned strength ... ... ... 162

(Superior Engineering Estbt. consists of a staff of Engineers, military and civil). In addition to I S. E officers, 62 officers of the Provincial Engineering Service recruited from the Upper Subordinate establishment, etc. are employed under State Railways Appointments to the India-recruited branch of I. S. E. are made from the Indian Engineering Colleges and by promotion from the P. E. Service. The whole question of the method of recruitment of other Railway Services is under consideration and information thereon is not available.

**Cadre, pay, etc., State Railways.**

**Ranks. :—**

(Same as shown under (2) )

*Pay of officers in rank A*

Rs 375 rising to Rs 1375 p.m. in the 24th year with an efficiency bar at Rs $\frac{675}{775}$ (9th year of service) if on $\frac{\text{junior}}{\text{senior}}$ scale of pay drawn by officers holding charges of $\frac{\text{less}}{\text{not less}}$ importance than a Divisional charge. No promotion from junior to senior scale of pay, (the latter commencing with Rs 625 p.m. from 4th year of service), unless reported qualified for the charge of a Division. Junior scale rising to a maximum of Rs. 975 p.m. at 15th year. Difference between junior and senior scale amounts generally to Rs. 100 p.m. This rate to pay applies to officers of Locomotive,

Carriage and Wagon Department, State Railways. A slightly lower scale is applied to the Traffic Department. Overseas pay varying from Rs, 150 to Rs. 300 p.m. allowed to officers of non-Asiatic domicile and drawn in sterling at Rs. 10 converted into a pound.

GENERAL REMARKS.—Recruitment. Departmental permanent establishment is recruited from following services :—

(1) Officers of Royal Engineers.

(2) Qualified Engineers with British degrees, appointed by the Secy. of State by selection from the United Kingdom.

(3) Persons educated at Govt. Civil Engineering Colleges in India and appointed by the Govt. of India [vide remarks under "Recruitment" under (1) ]

(4) Occasional admission of other qualified persons.

**Age for admission.**

Not less than 21 and not more than 24 on 1st August. Indians must obtain a certificate of age and nationality in the usual form.

**Promotion.**

Promotions from executive rank dependent on occurrence of vacancies in sanctioned establishment.

LIST OF DEGREES REFERRED TO IN THE RULES.

**General rules.**

Candidates who rely on a degree in "Mechanical" or "Electrical" Engineering or in "Naval

Architecture" should have had at least one year's practical experience in Civil Engineering.

## List A.

*Oxford.*—B.A., with Honours in the Engineering Science Final Honours School.

*Cambridge.*—B.A., with Honours in Mechanical Science Tripos.

*St. Andrews*—B.Sc. in Engineering.

*Glasgow.*—B.Sc. in Engineering.

*Edinburgh.*—B.Sc., in Engineering.

*Dublin.*—B.A.I., with Honours in Engineering.

*Durham.*—B.Sc., with Honours in Civil, Mechanical, or Electrical Engineering, or in Naval Architecture.

*London.*—B.Sc., with Honours in Civil and Mechanical or Electrical Engineering.

Recognised Degrees.

*Victoria University (Manchester).*—B.Sc., with Honours in Engineering.

*Birmingham.*—B.Sc, with Honours in Civil, Mechanical, or Electrical Engineering.

*Liverpool.*—B.Eng., with Honours in Civil, Mechanical, or Electrical Engineering, or Naval Architecture.

*Leeds.*—B.Sc., with Honours in Civil, Mechanical or Electrical Engineering.

*Sheffield.*—B.Eng., with Honours in Civil, Mechanical or Electrical Engineering.

*Bristol.*—B.Sc, with Honours in Civil or Mechanical Engineering.

## List B.

Recognised Universities.

*Dublin.*—B.A.I.

*Durham.*—B.Sc. in Civil, Mechanical, or Electrical Engineering, or in Naval Architecture.

*London.*—B.Sc. (Engineering).

*Victoria University (Manchester).*—B.Sc. (Tech) in Mechanical or Electrical Engineering (Honours Division in the Final Examination).

*University of Wales.*—B.Sc. (in Civil, Mechanical, or Electrical Engineering).

*Birmingham.*—B.Sc. (Engineering).

*Liverpool.*—B.Eng.

*Leeds.*—B.Sc. in Civil or Mechanical Engineering.

*Sheeffild.*—B.Eng. (First Class in the Final Examination).

*National University of Ireland.*—B.E.

*Bristol.*—B.Sc. in Civil or Mechanical Engineering.

*Note.*—The above degrees in Lists A and B will be accepted only if taken after three years' study and the passing of the regular examinations in the several Universities. The condition as to three years' study will not, however, apply to Indians who, having taken an Indian degree which exempts them from part of the University course, shall have taken one of the above degrees in less

than three years in accordance with the regulations of the University concerned.

## NOTE FOR THE INFORMATION AND GUIDANCE OF CANDIDATES.

The Selection Committee of 1906 drew attention to the subjects which were held to be of most importance for the Public Works Service, viz.,

*Pure Mathematics*, including a knowledge of the differential and Intergral calculus.

*Applied Mathematics.*

*Geometrical and Engineering Drawing.*

*Surveying and Geodesy.*

*Strength of Materials and Theory of Structures.*

*Hydraulics.*

*Heat Engines.*

*Materials used in Construction.*

*Building Construction.*—Wood and metal work, limes and cements, and building with stone, brick, and concrete.

***Knowledge of the principles*** of road-making, waterworks, sanitary and railway engineering (Important.)

The Selection Committee were further of opinion that all candidates should have had some workshop training.

# APPENDIX XIV.

## Indian Posts and Telegraphs

### (*a*) Post Office Section.

Sanctioned strength ... 214
(excluding officers of Telegraph Engineering in Postal Section and gazetted Postmasters.)

**Cadre and pay.**

| | | Rs. |
|---|---|---|
| | Director-General, Posts and Telegraphs ... | 4,000 |
| 10 | Postmasters-General—(5 reserved for I.C.S. officers with an extra pay of Rs. 250 p.m. in addition to superior time-scale I.C.S. salary, | |
| 1 | reserved for Telegraph Engineering officer ... | 2,250 |
| 3 | Departmental Officers on | 1750-100-2250 |
| | and one selection post | 2,500 |
| | Two Postmasters-General act as Dy. D. G. and draw a duty allowance of Rs. 200 each. | |
| 6 | Assistant Directors-General ... ... | 800-60-1400 |
| 14 | Deputy Postmasters-General—(1 Telegraph Engineering Officer and shown under Engineering cadre and 13 Departmental Officers. | |
| 4 | Presidency Postmasters ... ... | 1,000-1,200 |
| 181 | Superintendents ... ... ... | 250-20-300-20-700 |
| 39 | Gazetted Postmasters—(one on Rs. 700-25-800 and 38 on Rs. 350-20-650). | |

### (*b*) Telegraph Traffic.

| | | cadre. |
|---|---|---|
| (i) | Superior Traffic ... ... ... (Rs. 350-20-550-30-700) | 35 |
| (ii) | Deputy Superintendents, Traffic, | |
| | 1st. Class ... (Rs. 500-20-600) | 20 |
| | 2nd. Class ... (Rs. 350-20-450) | 34 |
| (iii) | Telegraph Masters, Traffic ... ... (Rs. 275-10-325, „ 200-10-250, „ 180-10 230) | 353 |

## (c) Telegraph Engineering.

| | | cadre. | |
|---|---|---|---|
| | I (General) | | Telegraph. |
| (i) | Assistant Engineers ... ... (Rs. 350-20-550-30-700) | 15 | |
| (ii) | Deputy Assistant Engineers | | |
| | 1st. Class. ... (Rs. 500-20-600) | 22 | |
| | 2nd. Class ... ... (Rs. 350-20-450) | 40 | |
| | II (Telephone) | | |
| (i) | Assistant Engineers ... ... (Rs. 350-20-550-30-700) | 2 | |
| (ii) | Deputy Assistant Engineers | | |
| | 1st. Class ... ... (Rs. 500-20-600) ; | 3 | |
| | 2nd. Class ... ... (Rs. 350-20-450) | 10 | |
| | III—(Electrical) | | |
| (i) | Assistant Electricians ... ... (Rs. 350-20-550-30-700) | 4 | Wireless Branch. |
| (ii) | Deputy Assistant Electricians | | |
| | 1st. Class ... ... (Rs. 500-20-600) ; | 6 | |
| | 2nd. Class ... ... (Rs. 350-20-450) | 11 | |
| | IV—(Engineering Supervision). | | |
| (i) | General ... ... ... (Rs. 80-5-100-10-250-20-350) | 14 | |
| (ii) | Telephone ... ... (Rs. 80-5-100-10-250-20-350) | 49 | |
| (iii) | Electrical Supervision ... ... (Rs. 80-5-100-10-250-20-350) | 58 | |

V—(Workshop)

| | | |
|---|---|---|
| Superintendent ... (Rs. 1025-50-1520) | ... ... | 1 |
| Assistant Superintendent (Rs. 650-50-1000) | ... ... | 1 |
| Branch Manager ... (Rs. 500-20-700) | ... ... | 2 |
| Foreman ... ... (Rs. 500-20-700) | ... ... | 3 |

GENERAL REMARKS.—Out of ten appointments of Postmasters-General five are reserved for members of the I.C.S. and carry an extra pay of Rs. 250 p. m. in addition to the salary under the I. C. S. time-scale. Vacancies in the Post Office section of the Indian Posts and Telegraphs are generally filled by recruitment in the grade of Probationary Superintendents, Post Office and R. M. S., of which the sanctioned strength is 15. Candidates must be graduates of good social standing and physical fitness. They draw pay at Rs. 200 a month and are confirmed as Superintendents on passing a departmental examination. A candidate seeking selection as a Probationary Superintendent should apply to the Postmaster-General of the Province in which he is domiciled. A certain number of subordinates are also selected as Superintendents after passing the departmental examination. Gazetted Postmasters are promoted departmental subordinates.

**Probationary Superintendents.**

In the Superior Telegraph, Engineering and Wireless Branch 25 per cent. of appointments are to

be recruited in England and 75 per cent. in India, the recruitment being by open competition. The classes other than (i) in each case are subordinates and are recruited in India. The cadre, pay, and recruitment of the Engineering Branch are shown under the Indian Service of Engineers.

Owing to the predominance of Engineers and Electricians in Indian Posts and Telegraphs, the Post Office section recruitment which is now made from among selected graduates and departmental subordinates, may be altered in favour of men with technical qualifications. But in the interests of efficiency, a reasonable portion of officers with superior general education and departmental knowledge may be considered preferable to an almost wholesale technical staff.

## APPENDIX XV.

### Imperial Customs Service

Sanctioned strength ... 26

Cadre and pay.

| | Pay | |
|---|---|---|
| One Collector | ... Rs. 3,000 p.m. | |
| | *O. P. £13-6-8. | |
| Two Collectors | ... Rs. 2,250 „ | each. |
| Two Collectors | ... Rs. 2,050 „ | „ |

(Three of these posts are reserved for the I. C. S.)

21 Assistant Collectors ... Rs. 350-50-1,400 in the 22nd year.

Three Assistant Collectorships are held by I. C. S. officers.

Overseas pay when admissible.

Assistant Collectors other than members of the I. C. S. are ordinarily recruited in England as well as in India on the same rules as apply to the Indian Audit and Accounts Service (*vide* pp. 176-178), not less than half the vacancies being filled by appointment in India of statutory natives of India.

**Indian recruitment up to 50 per cent.**

## APPENDIX XVI.

### Indian Political Department

**Constitution.**

The Political Department of the Government of India is composed partly of officers of the Indian Civil Service and partly of Indian Army officers. After ten years' service in the Department the latter are placed on a "supernumerary list" and are no longer recallable to military duty. Twenty-five per cent of the total number of officers recruited annually will in future be Indians who will be recruited, as at present, from the Indian Civil Service, the Provincial Service and the Indian Army.

**Indian recruitment up to 25 per cent.**

**Pay.**

The rate of pay admissible to I. C. S. and I. A. officers in political service is as follows :—

**Pay in the Indian Political Dept. for officers other than those promoted from the Provincial Service.**

First four years ... Rs. 500-50-650 p.m.
5th to 7th „ ... Rs. 750-50-850 „
8th & 9th „ ... Rs. 950 & 1,000 „ respectively
10th to 18th „ ... Rs. 1,200-100-2000 p. m.
19th to 23rd „
and thereafter ... Rs. 2,050-50-2,250 „

Overseas pay as in the I. C. S.

## APPENDIX XVII.

### Miscellaneous Imperial Appointments

Some of the miscellaneous Imperial Services and appointments are shown in Appendix XI, p. 209. For these and similar other appointments in the Mint and Assay Department, Mines, Indian Stores Department including Govt. Test House, Printing and Stationery Department, Commercial Intelligence and Statistics, Explosives, Patents and Designs there are no special rules for admission and candidates may make necessary enquiries from the departments concerned.

No special rules for miscellaneous appointments

There are a few other superior appointments on the Imperial establishment, such as those of chemists and curators, dentists, Economic Reporter and Engineers outside the Indian Service of Engineers. Several of these civil gazetted appointments are under the Army Department. The Army and other Imperial Secretariats have several other gazetted officers in the ranks of Superintendents, and Assistant Secretaries and Assistant Financial Advisers who are promoted secretariat assistants of ability and merit. The Imperial secretariat establishment which is not yet organised as a service, offers openings for educated youths and admission thereto is controlled by periodical examinations conducted by the Staff Selection Board.

Imperial Secretariat Service.

## APPENDIX XVIII.

### Army Careers

**Indianisation of the superior army services.**

One of the tangible benefits accruing from the Reforms is the growing Indianisation of the superior civil services. The superior army services will now have to be similarly Indianised if India is to attain to the Dominion status by progressive stages and the question is now being examined by the Skeen Committee. Calculated on the sanctioned strengths of the Services, as shown in the preceding Appendices, there are nearly 5,000 superior Imperial civil appointments and on an annual casualty of roughly 5% requiring replacement, about 125 Indians may be recruited annually at the outset under the present limited Indianisation scheme. Compared with this number employable in the All-India Services it might not be deemed inconsiderable if the Indian Army alone could find employment for a few cadets annually out of the proposed Indian Sandhurst and Woolwich. The number to be provided for and the time involved are not apparently so material as keeping the door open to army careers for all eligible candidates. It is quite plain that military training according to modern needs is extremely costly and that it is a matter of 30 to 50 years to find and train the requisite number of Indian officers for all arms of

**Modern military training how to be adapted to Indian requirements.**

the Army and the Navy. But with enthusiasm as was evinced during the late War and with the Indian ideal of "plain living and high thinking," it might perhaps be possible for her to achieve in a few years what would otherwise require a much longer time and to manage with a £100 what would ordinarily cost a thousand elsewhere. The question is one of a father educating his son, the recent welcome announcement of the Government decision to admit Indians to the commissioned rank in the Navy being an indication of this paternal solicitude. Modern India is really an offspring of British civilisation, and no consideration of cost and time need arise to stand between.

## Summary

All-India Services.

Appendices I-XVIII indicate the salient points of the All-India Services, leaving details to be obtained by interested parties at Home and in India either from the India Office, London, University Appointments Board, Cambridge, or from the Government of India Secretariat, Simla, as the case may be. In paragraph 103 of the Lee Commission's Report it was recommended that efforts should be made to stimulate recruitment in England by well-considered propaganda and that with this end in view the India Office should establish some permanent *liaison* with the British Universities. The propaganda initiated accordingly in 1924 has already resulted beneficially, there being a larger

How to stimulate recruitment.

number of British youths at the I. C. S. examination in August 1925 than in preceding 4 years. As it may not be advisable or possible to continue this propaganda work in British Universities, the information given in this volume may perhaps help in enlightening the English lads who are either desirous of Indian careers or who may wish to have some correct ideas about Indian affairs.

**Help afforded by this volume.**

So far as Indian students are concerned, the Appendices, as also the introductory chapters I-VIII, pages 1-152, may be carefully read and digested until one feels satisfied as to the career which may be profitably pursued in his or her particular case. If there is a right choice coupled with the necessary energy, everything else is sure to solve itself. It has been pointed out that admission to, and success in, the services alone do not constitute the goal and that there are numerous other ways of attaining success, preferably in *independent* careers, through grit, intelligence and character. No barriers, social or otherwise, should be considered too great to be overcome and no honest labour too low to be acceptable. The facts plainly told here afford (*i*) to every guardian an opportunity to survey the whole position calmly and to make a choice accordingly, (*ii*) to every middle-class boy or girl, Anglo-Indian or Indian, in the secondary stage of education, to proceed with a *definite* plan according to circumstances, ability and opportunities available and (*iii*) to every member

**Essentials to be remembered.**

of labouring classes to make up his mind to be trained specially for progress in his own *ancestral* calling, the highest kind of technological education being made available for such callings. These basic principles being observed, overcrowding in literary careers or unemployment in general will hardly arise and education will hardly deteriorate.

Further, the excellent summaries as to avenues of employment in provincial and subordinate services, which have been generously supplied by the governments of U. P. and Bombay and which are included in Appendices XXII and XXIII, are of general interest to all wage earners throughout India, the information embodied therein and in other Appendices being generally of such a character as is indispensable for all. These summaries have avoided the necessity for repeating similar information with regard to other provinces and rendered this volume a compact one for convenient use everywhere, whether in government departments, public and private offices or in educational institutions.

## APPENDIX XIX.

### Provincial Services

*(Bengal)*

**Recruitment by competitive examination.**

The provincial services in Bengal, which generally carry the prize appointments thereof and recruitment to which is made by a competitive examination, are as follows :—

| | |
|---|---|
| The Bengal Civil Service (Executive). (295) | The Subordinate Civil Service. (442) |
| The Bengal Excise Service. (23) | The Subordinate Excise Service. (59) |
| The Bengal Police Service. (28) | The Upper Division of the Secretariat Clerical Service. |
| The Income-Tax Department. (76) | |

(The authorised cadre in each case is shown in brackets.)

The indispensable qualifications of a candidate are—

**Qualifications for admission.**

(*a*) that he is a native of the province or has a permanent domicile within the province. [This domicile qualification applies to all provinces in respect of admission to the public services therein.]

(*b*) that he is a natural born subject of His Majesty or of an Indian State ;

(*c*) that he is more than 22 and less than 25 years of age on the 1st August of the year in which the examination is held ;

(*d*) that he is a graduate ;

(*e*) that he is of good character ;

(*f*) that he is of sound health, good physique, active habits and free from organic defect or bodily infirmity.

(The rules as to the minimum age and general educational qualifications, however, vary in different provinces. As regards recruitment to the Secretariat Clerical Services, some provinces appoint candidates who have passed the examination held by the Staff Selection Board of the Government of India referred to in page 223).

## Bengal Provincial Executive Service

### (Monthly rates of pay)

| Year of service. | Scale of pay per mensem. | Pay of Deputy Magistrates and Deputy Collectors. |
|---|---|---|
| | Rs. | |
| 1st year } (Probationers) | ... 250 | |
| 2nd „ } | ... 275 | |
| 3rd „ (on confirmation) | ... 300 | |
| 4th „ ... ... | ... 300 | |
| 5th „ ... ... | ... 350 | |
| 6th „ ... ... | ... 350 | |
| 7th „ ... ... | ... 400 | |
| 8th „ ... ... | ... 400 | |
| 9th „ ... ... | ... 450 | |
| 10th „ ... ... | ... 450 | |
| 11th „ ... ... | ... 500 | |
| 12th „ ... ... | ... 500 | |

**Bengal Provincial Executive Service**—*(contd.)*

(Monthly rates of pay)

| Year of service. | Scale of pay per mensem. |
|---|---|
| | Rs. |
| Efficiency bar. | |
| 13th year ... ... ... | 550 |
| 14th „ ... ... ... ... | 550 |
| 15th „ ... ... ... ... | 600 |
| 16th „ ... ... ... ... | 600 |
| 17th „ ... ... ... ... | 650 |
| 18th „ ... ... ... ... | 650 |
| 19th „ ... ... ... | 700 |
| 20th „ ... ... ... ... | 700 |
| Efficiency bar. | |
| 21st year ... ... ... ... | 750 |
| 22nd „ ... ... ... ... | 750 |
| 23rd „ ... ... ... ... | 800 |
| 24th „ ... ... ... ... | 800 |
| 25th „ and over ... ... ... | 850 |
| Selection grade for 3 per cent. of the total cadre ... ... | 1,000 |

**Pay of Excise Superintendents.**

The above rates of pay apply to officers of the Excise Service.

**Designation of members, Provincial Services (Executive and Judicial).**

2. The Provincial Executive and Judicial Services (Upper Division) are known as the Civil Services, Bengal, Bombay, Burma, etc., respectively. The members thereof in the Executive Branch are generally designated Deputy Magistrates and Deputy Collectors. The members of the Provincial Judicial and Subordinate Civil Services are, however, variously designated, namely, those

in the Judicial Branch are generally called Munsifs and Sub-Judges, while names such as Tahsildars, Myooks, Mamlatdars, Sub-Magistrates, etc., indicate members of the Subordinate Executive or Land Settlement Services.

3. The rates of pay obtaining in several provinces are generally on similar lines and as the available space in this volume does not admit of going into details, such particulars are given here as convey a general idea applicable essentially to all provinces. Each province has also its own rules as to recruitment and applications may be made to the local government secretariat (generally Appointment or Chief Secretary's Department) for copies.

4. The Judicial Branch of the Provincial Civil Service (Bengal Judicial Cadre—293) has rates of pay similar to those shown under the Executive Service and vacancies are generally filled by direct appointment of a graduate in Law, a barrister-at-law, a vakil, advocate or an attorney who previously submitted his application to the High Court or Judicial Commissioner through proper channel and who, after nomination and appointment, remains on probation for 2 years until confirmed. In Burma the recruitment is half by promotion from the subordinate Judicial Service and half by direct appointment. **Pay, etc., Judicial Branch.**

5. The principle of recruitment by promotion to some extent is observed in most provinces and

the non-existence of this rule in any province is considered to constitute a distinct hardship.

**Probationary period.**

4. In the Provincial Executive Service persons directly appointed as Deputy Magistrates and Deputy Collectors remain on probation for a period of two years, their increment of pay in the second year of probation depending on their passing the departmental test by the lower standard, and their confirmation on their passing that test by the higher standard coupled with general fitness. If confirmed, their service for leave and pension reckons from the date of their first appointment. Promotion to the Rs. 1,000 grade is made strictly by selection.

## Subordinate Executive Service

(*Bengal*)

(Monthly rates of pay)

**Pay of Sub-Deputy Collectors.**

| Year of service. | | Scale of pay per mensem |
|---|---|---|
| | | Rs. |
| 1st year | Probationers | 150 |
| 2nd „ | | 175 |
| 3rd „ | (on confirmation) | 200 |
| 4th „ | | 200 |
| 5th „ | | 200 |
| 6th „ | | 225 |
| 7th „ | | 225 |
| 8th „ | | 225 |
| 9th „ | | 250 |
| 10th „ | | 250 |
| 11th „ | | 250 |

**Subordinate Executive Service—(*contd.*)**

(*Bengal*)

(Monthly rates of pay)

| Year of service. | Scale of pay per mensem. |
|---|---|
| | Rs. |
| **Efficiency bar.** | |
| 12th year ... ... | 275 |
| 13th „ ... ... ... | 275 |
| 14th „ ... ... ... | 275 |
| 15th „ ... ... ... | 300 |
| 16th „ ... ... ... | 300 |
| 17th „ ... ... ... | 300 |
| 18th „ ... ... ... | 325 |
| 19th „ ... ... ... | 325 |
| 20th „ ... ... ... | 325 |
| 21th „ ... ... ... | 350 |
| 22nd „ ... ... ... | 350 |
| 23rd „ ... ... ... | 375 |
| 24th „ ... ... ... | 375 |
| 25th „ and over ... ... | 400 |

A special grade on Rs. 450 a month, containing posts equal to three *per cent.* of the cadre. Promotion thereto is made strictly by selection.

Pay of Myooks.

In Burma there is a subordinate Judicial Service in addition to the Subordinate Executive Service and the pay in either case is Rs. 200-10-300 and Rs. 325 in 15th year. Subordinate Executive officers drawing these rates of pay are designated Myooks.

2. As in the Bengal Civil Service, probationers in the Subordinate Executive Service are full

Probationary period.

members of the service. The normal period of probation is two years ; and the increment of pay at the close of the first year depends on an officer's having passed the departmental examination by the lower standard, while his further increment and confirmation in the service at the close of the second year will depend on his passing that examination by the higher standard. Confirmation in the service will also be subject to an officer's general fitness ; and if confirmed he will reckon service for leave and pension from the date of his first appointment.

## APPENDIX XX.

### Provincial Services—(*Contd.*)

(*Burma*).

Pay of Civil Service (Burma), Executive and Judicial Branches.

In Burma the rates of pay fixed for the Executive Civil Service and the Judicial Service are Rs. 50 higher than the limits (minimum and maximum) for other provinces and consequently the pay on confirmation is Rs. 350 against Rs. 300 and Rs. 900 against Rs. 850 as shown in pages 229-30.

As in Bengal there is a selection grade in Burma for each service to the extent of 3% of the cadre of the service. On the present strength the number of selection posts is 4 for the Burma Executive Civil Service and one for the Judicial Service, the pay being Rs. 1000—50—1,250 p. m.

Officers appointed to the Burma Civil Service or the Burma Judicial Service by promotion from Subordinate Civil or Subordinate Judicial Service receive a minimum pay of Rs. 375 p.m.

Recruitments to the Burma Civil Service and Subordinate Civil Service are partly by examination and partly by promotion. Competitive examinations are held for appointments to a few vacancies, the nature of the examination being as follows :—

## Subjects for Examination

Recruitment by examination.

| Burma Civil Service | | Subordinate Civil Service. | |
|---|---|---|---|
| *Compulsory* | Marks | *Compulsory* | Marks |
| (i) Essay ... ... | 200 | (i) Essay ... ... | 200 |
| (ii) Political Science ... | 200 | (ii) English Composition | 100 |
| *Viva Voce* ... ... | 100 | (iii) Burmese Composition | 200 |
| *Optional* | | *Optional* | |
| *Viva Voce* ... ... | 200 | Candidates are allowed to offer three optionals out of 13 subjects with permission to count marks in two optional subjects and *viva voce* in each optional subject except Mathematics. | |
| Any two out of 12 optional subjects, namaly, (1) Pure Mathematics (2) Applied Mathematics, (3) Physics, (4) Chemistry, (5) Geology, (6) Zoology, (7) Botany, (8) Philosophy, (9) History, (10) English Language and Literature (11) Pali, (12) Burmese Language and Literature. No *viva voce* in Mathematics. | | | |

Cadre and Pay.

The cadres of executive posts in Burma as sanctioned in 1922 are :—

| | |
|---|---|
| Burma Frontier Service | 35 |
| „ Civil Service | 193 |
| Myooks | 285 |
| Deputy Myooks | 150 |
| Total | 663 |

Members of the Burma Frontier Service receive pay rising from Rs. 400 in the 1st year to Rs. 1,250 p.m. in the 23rd year by an annual increment of Rs. 25 or Rs. 50 and with overseas pay of Rs 125, 150, 200 and 250 admissible in addition to officers of non-Asiatic domicile. The pay of Myooks is shown in page 233, and that of a Deputy Myook is Rs. 150 p.m. In case of direct appointment to the Burma Frontier Service candidates must not be under 21 or over 25 years of age and should be in possession of a University degree. Those conditions are, however, relaxed in the case of officers with military service.

## APPENDIX XXI.

### Provincial Services—(*contd.*)

(*Bihar and Orissa*)

### Rules for Recruitment of Superintendents of of Excise and Salt

Provincial Excise Service.

1. The Superintendents' cadre is graded as follows :—

(*a*) 19 posts on a time-scale of Rs. 250 rising to Rs. 500 in 14 years by annual increments of Rs. 15 during the first ten years, and Rs. 25 during the last four years, subject to the service being approved.

(*b*) 2 posts on Rs. 600.

(c) 2 posts on Rs. 700.

2. Promotion to the grades of Rs. 600 and Rs. 700 will be made by the Governor-in-Council by special selection for merit. Seniority alone will not give a claim to appointment in these two grades.

3. Superintendents will be appointed, either by direct appointment or by promotion of Inspectors of Excise and Salt, as may be considered desirable on the occurrence of each vacancy. Appointments in all cases will be made against actual and not against anticipated

Superintendents of Excise.

vacancies, but steps will be taken to select a candidate as soon as it is known for certain that a vacancy will occur.

4. All direct appointments will be made by the Governor-in-Council, in consultation with the Board of Revenue, by selection from candidates for the Executive Branch of the Provincial Civil Service.

5. When the vacancies occur, the Commissioner of Excise will submit to the Board of Revenue the names of twice as many Inspectors as the number of Superintendents to be appointed. The name will be arranged in order of preference and will be accompanied by brief statements of services and qualifications. The recommendations will ordinarily be confined to officers who have not exceeded the age of 40 years and are likely to be able to pass the departmental examinations.

6. The Board of Revenue will transmit the Commissioner's nominations, with its own remarks thereon, to the Governor in Council, by whom the appointments will be made.

7. All Superintendents appointed direct will be on probation for a period of two years. At the end of this period they may be confirmed if they have passed the prescribed departmental examination. In the case of officers promoted from the rank of Inspector, there will be no minimum period of probation, and they will be confirmed on their passing the departmental examination.

8. During the period of their probation Superintendents will receive an allowance of Rs. 250 a month.

## Rules for appointment of Inspectors of Excise and Salt.

(*Bihar and Orissa*)

Provincial Subordinate Excise Service.

1. The cadre of Inspectors of Excise and Salt is divided into six grades as follows :—

| Grade. | Pay. | Grade. | Pay. |
|---|---|---|---|
| | Rs | | Rs. |
| I | 300 | IV | 175 |
| II | 250 | V | 150 |
| III | 200 | VI | 125 |

2. Inspectors of Excise and Salt will be appointed either by the promotion of selected Sub-Inspectors by the Commissioner of Excise and Salt, or by direct appointment by the Board. Not more than 20 per cent. of the vacancies will be filled by direct appointment.

## Rules for Appointment of Sub-Inspectors of Excise and Salt.

(*Bihar and Orissa*)

1. The cadre of Sub-Inspectors of Excise and Salt is divided into six grades as follows :—

| Grade. | Pay. | Grade. | Pay. |
|---|---|---|---|
| | Rs. | | Rs. |
| I | 125 | IV | 70 |
| II | 100 | V | 60 |
| III | 80 | VI | 50 |

2. Sub-Inspectors of Excise and Salt will be appointed either by the promotion of selected "petty officers" or by *direct* appointment, by the Commissioner of Excise and Salt. Not more than 15 per cent. of the vacancies may be filled by promotion of petty officers.

## APPENDIX XXII.

### Provincial Services —(*contd.*).

(*United Provinces*)

### Regulations for the appointment of Deputy Superintendents of Police

I.—Deputy Superintendents of Police shall be appointed—

(A) by direct recruitment;

(B) by the promotion of Inspectors of Police.

**Provincial Police Service.**

Not more than one half of the total number of appointments shall be made by direct recruitment and the remainder by the promotion of Inspectors of Police.

In the case of both classes nominees must be statutory natives of India.

II.—All appointments will be made by the Governor in Council.

III.—The following rules regulate the appointment of Deputy Superintendents :—

**(A) Direct Recruitment.**

*(i) Method of Selection.*

**Applications will be considered by a Selection Committee.**

## (B) By promotion.

Appointments will be made by the Governor in Council on the recommendations of the Inspector-General of Police. No age-limit will be fixed, but a fair knowledge of English will be required.

Recruitment of Deputy Superintendents of Police, U. P.

IV.—(1) The Deputy Superintendents of class A on first appointment will get Rs. 200 per mensem They will be entitled to their first increment after one year but will receive no further increments till they have passed their departmental examinations and been confirmed.

(2) The pay of Deputy Superintendents of class B on first appointment will depend on their pay as Inspectors at the time of promotion and will be fixed at such stage on the time-scale above their pay as Inspectors as the Governor in Council shall think fit, subject to a maximum of Rs. 400 per mensem.

(3) Deputy Superintendents of both classes will be entered on the list according to the date of their appointments. In the event of two or more Deputy Superintendents being appointed on the same date the order of their seniority will be determined by the Governor in Council.

(4) The period of probation of Deputy Superintendents of class A will last for two years.

(5) Deputy Superintendents of class A will be required to attend a course of instruction at the Provincial Training School extending to eighteen

Pay of Deputy Superintendents of Police.

months, and, until they have passed, to appear at successive departmental examinations for junior officers in the subjects prescribed for Assistant Superintendents of Police.

V.—Deputy Superintendents of class B will, on appointment, be posted to districts.

VI.—Deputy Superintendents of class A will, after being posted to districts, be required to obtain the certificates of efficiency in practical working prescribed for Assistant Superintendents of Police.

VII.—The time scale of pay for Deputy Superintendents of Police is Rs. 250—25—400—20—700 with a special selection grade on Rs. 750—25—850 for 7 per cent. of the cadre. There is an efficiency bar at Rs. 440. Promotion to the special selection grade will be made only for outstanding merit. Strength—43.

**Statement showing the pay, etc. of each rank of the subordinate service, U. P.**

**Inspectors.**

(1) *Pay.*

| 1st grade | 2nd grade | 3rd grade | 4th grade |
|---|---|---|---|
| Rs. 300 | 260 | 220 | 180 |

(2) *Allowances.*

(a) *Local allowance.*

| | Rs. | |
|---|---|---|
| (1) City and circle inspectors of certain large cities | ... | 50 p.m. |
| | | 25 „ |

**Statement showing the pay, etc. of each rank of the subordinate service.—*contd.***

Inspectors.

| | Rs. | | |
|---|---|---|---|
| (2) Reserve Inspectors of certain large cities ... ... ... | 25 | p.m. | Allowances of Police Inspectors. |
| (3) Short hand allowance to certain Inspectors of the C. I. D. ... | 30 | „ | |
| (b) *Conveyance allowance.* | | | |
| (1) Reserve Inspectors in districts and Divisional Inspectors in Government Railway Police ... | 15 | „ | |
| (2) Prosecuting inspector in districts and Government Railway Police ... ... | 25 | „ | |
| (3) Circle inspectors in big cities ... | 25 | „ | |
| (4) Inspectors attached to C. I. D. ... | 25 | „ | |
| (c) *Duty allowance.* | | | |
| (1) One inspector attached to the office of Asstt. to Inspr. Genl. in charge Govt. Railway Police, as Superintendent... | 50 | „ | |
| (2) Inspectors attached to the Criminal Investigation Department ... ... ... | 70 & 60 | p.m. | |
| (d) *Local Hill allowance in hill tracts.* | | | |
| (1) European Inspectors ... | 50 | „ | |
| (2) Indian Inspectors ... ... | 25 | „ | |

**Statement showing the pay, etc. of each rank of the subordinate service.—*contd.***

**Inspectors.**

Rs.

(e) *House rent allowance.*

(1) Prosecuting inspectors not provided with Government quarters ... ... Up to 15 p.m.

Inspectors except circle inspectors are entitled to free accommodation but where Govt. quarters are not available houses are rented for them.

**Sergeants.**

(1) *Pay.*

| 1st grade | 2nd grade |
|---|---|
| Rs. 150 | 125 |

(2) *Allowance-local (hill) allowance in hill tracts.*

Hill allowance ... ... 25 p.m.

**Sub-inspectors.**

(1) *Pay.*

| Selection grade | 1st grade | 2nd grade | 3rd grade | 4th grade |
|---|---|---|---|---|
| Rs. 150 | 125 | 100 | 80 | 70 |

(2) *Allowances.*

*Horse and conveyance allowance.*

(2) Sub-inspectors, civil police, at head quarters ... ... 25 p.m.

## Provincial Services.—(*contd.*)

*(United Provinces)*

### Provincial Veterinary Service

Provincial Veterinary Service.

In all provinces other than Burma the minimum pay of an officer in the Provincial Veterinary Service is Rs 250 and the maximum Rs. 750 with a probationary rate of Rs. 200 for two years and an efficiency bar at Rs. 500. In Burma the pay is Rs. 50 higher. These officers are ordinarily appointed by promotion from the subordinate veterinary service. The present cadre consists of three posts of Deputy Superintendents. They are allowed to undertake private practice in so far it does not interfere with efficient performance of official duties.

### Provincial Educational Service

This note may be read in conjunction with that on Bombay Educational Service, pp. 266-269.

Provincial Educational Service.

There are no definite rules fixed for recruitment to the United Provinces Educational Service. Direct recruitment on the side of the men's branch of the United Provinces Educational Service is not usually made. Such posts are generally filled by the appointment of officers serving in the Subordinate Educational Service, seniority and merit being taken into account. This procedure is, however, not strictly followed in filling up posts in women's branch of the service. The best candi-

date available is appointed. The permanent strength of the United Provinces Educational Service (men's branch) is 115 of which 55 are Headmasters, 14 Lecturers of Training Colleges, 8 Principals, 9 Assistant Masters in Govt. Intermediate Colleges and 10 Assistant Inspectors of Schools. The pay is 250-50-2-300-25-675 per mensem with a selection grade of Rs. 700-50-800 per mensem for 20% of the cadre.

The present permanent strength of the United Provinces Educational Service (women's branch) is 10. They are also on a time-scale of pay, Rs. 200-15-500.

The sanctioned cadre of educational appointments open to women graduates in the U. P. gives an idea of the very limited number of such appointments available throughout India. The best scope for higher female education appears to lie in training in Domestic Economy in which there is a degree course in British Universities. The most useful line would be a training in a branch of applied science bearing on Child Welfare, Nature Study, Physiology, Midwifery, etc.

### Provincial Engineering Service

**Provincial Engineering Service.**

1. Appointments to the service are made from any of the following three sources :—

(1) Persons who have qualified as engineers at an Engineering College or University in India or at a recognized College in

Great Britain, and persons who hold a degree of engineering from a University in India or Great Britain.

(2) Upper subordinates in permanent or temporary service, and of exceptional and proved merit.

(3) Members of the United Provinces Subordinate Engineering Service.

2. In making appointments preference is given to persons who have qualified in the Civil Engineering class of the Thomason Civil Engineering College, Roorkee.

Pay, Provincial Engineering Service, U. P.

3. The pay of the service is on a time-scale, starting on Rs. 250 rising with an annual increment of Rs. 20 for approved service to Rs. 750 per mensem. There is also an efficiency bar at Rs. 550.

In the case of persons under probation, the first increment is granted on confirmation.

4. Specially selected members of the United Provinces Engineering Service are eligible for promotion to the Indian Service of Engineers, subject to the condition that not more than one such appointment will be made in each alternate year.

An officer so promoted will draw the rate of pay on the scale of the Indian Service next above that drawn by him in the United Provinces Service, and he will take rank accordingly for seniority.

### Subordinate Engineering Service

Subordinate Engineering Service, U. P.

(1) Appointments are made from the following sources :—

1. Passed students of the "Overseer class" of the Thomason Civil Engineering College, Roorkee.
2. Upper and Lower Subordinates in permanent or temporary service in the Irrigation Branch of the United Provinces.

The foregoing note together with that in pp. 214-17 give all the information that an Engineering student may wish to know.

## Provincial Services.—(*contd.*)

*(United Provinces)*

### Jail Department

The staff of the Jail department is divided into two branches, executive and clerical, on the following scales of pay :—

Jailors (strength 72) Rs. 140-10 250-25-400 with efficiency bars at Rs 200 and Rs. 300. Deputy Jailors (strength 48) Rs 50-5-140 with efficiency bar at Rs. 100.

Clerical branch (strength 129) Rs. 40-4-100 with efficiency bar at Rs. 80.

Appointments to the executive branch are made on the recommendation of a Selection Board.

The minimum qualification for the clerical branch is the possession of School Leaving Certificate or Matriculation or the High School Examination certificate.

2. There are two posts of assistants to the Chemical Examiner, United Provinces, in the provincial service, both with pay from Rs. 250 to Rs. 450 rising by annual increments of Rs. 10. Recruitments to these posts are made either from medical men holding an assistant surgeon's qualifications and possessing the necessary theoretical and practical knowledge of Chemistry or from Science graduates who have undergone a special course of training in Chemistry in some recognized research laboratory in India.

Statement showing the sanctioned strength and pay of Jailors in Burma.

| Designations. | Pay. Minimum | Increment (yearly) | Maximum |
|---|---|---|---|
| | Rs. | Rs. | Rs. |
| 1. Four Jailors, 1st grade at ... ... | 400 | 20 | 500 |
| 2. Eleven Jailors, 2nd grade at ... | 250 | 10 | 300 |
| 3. Fifteen Jailors, 3rd grade at ... | 200 | 8 | 240 |
| 4. Twenty.three Jailors, 4th grade at ... | 160 | 6 | 190 |
| 5. Thirty-six Jailors, 5th grade at ... | 125 | 5 | 150 |
| 6. Twenty-one Jailors, 6th grade at ... | 100 | 3 | 115 |

In Bihar and Orissa the Subordinate Executive Service of the Jail Department consists of :

1st grade, 2 Asst. Jailors on Rs. 100 each.
2nd grade, 5 „ Jailors on Rs. 90 each.
3rd grade, 10 „ Jailors on Rs. 80 each.
4th grade, 20 Jailors on Rs. 70 each.
5th grade, 20 „ Jailors on Rs. 60 each.

Appointments are made by the Inspector-General of Prisons.

### Registration Department.

Cadre and Pay, Sub-Registrars, U. P.

The cadre consists of 194 Sub-Registrars divided into 11 grades with pay rising from Rs. 60 to Rs. 275 per mensem. Ordinarily first appointments are made on probation in the lowest grade subject to passing a departmental examination in Registration and Stamps Laws.

## Provincial Services—(*contd.*)

(*United Provinces*)

### Income-Tax Department

Cadre and Pay, Income-tax officers, U. P.

Appointments are made by the Commissioner of Income-tax, subject to the control of the Local Government, (*vide* rules applying to Bengal, p. 228).

Apart from other usual qualifications a candidate must be a graduate.

The cadre is as follows :—

| | | Rs. |
|---|---|---|
| Assistant Income-Tax officers | ... | 7 |
| Income-tax officers | ... | 41 |
| Assistant Commissioners of Income-tax | | 3 |
| | Total | 51 |

The time-scale of pay for Assistant Income-tax officers is Rs. 250-25-350; for Income-tax officers Rs. 350-30-800-25-900; and for Assistant Commissioners of Income-tax Rs. 1,000-100-1,500. There are efficiency bars at Rs. 500 and Rs. 710.

## Provincial Services—(*contd.*)

(*United Provinces*)

### Industries Department.

The provincial appointments are :—

| | Pay | | |
|---|---|---|---|
| Director of Industries | Rs. 1,900 | No prescribed rules for appointment to these superior posts. | Industries Dept. |
| Depy. Director of Industries | „ 1000-50-1500 | | |
| Asst. Director of Industries | „ 1,000 | | |
| Principal, Technological Institute, Cawnpore | „ 1,750-50-2250 | | |

There are several other appointments, such as those of Industrial Chemist, Principal, Government Technical Schools, Wood Technologist, etc.

Appointments carrying a salary of Rs. 200 and above are ordinarily filled on the recommendations of Selection Committees which are appointed to consider applications for vacancies which are advertised.

### Factory Inspection Staff

There are 3 Boiler Inspectors mainly on Rs. 600-25-900 and one Chief Inspector of Factories on Rs. 1,500. Officers of this department are ordinarily selected in India after advertisement and upon a report from the Head of the Department on the applications submitted.

### Provincial Medical Service

| | Cadre | Pay. | | |
|---|---|---|---|---|
| Asst. Surgeons, P.M.S. | 104 | Rs. 250-12½-500 | Eligible for civil surgeoncy after 14 years of service. | Provincial Medical Service. |
| Civil Surgeons, „ | 13 | Rs. 600-50-1,000 | | |

## Public Health Department

Pay of Public Health officers, U. P.

3 Non-I. M. S. Assistant Directors of Public Health on Rs. 666 rising to Rs. 1,200 in 16th year and Rs. 1333⅓ in 25th year; 4 appointments of Malaria and Hygiene officers on Rs. 350—50-2—700; one appointment of Asst. Hygiene Publicity Officer on Rs. 200—20-2—400; 7 Municipal Health Officers on Rs. 500—50-2—900, 14 on Rs. 350—50-2—700, 9 on Rs. 200—20-2—400 and 4 on Rs. 200 p.m.; also 9 District Medical Officers on Rs. 350—50-2—700, 10 Asst. District Medical Officers on Rs. 200—20-2—400 and 36 Medical Officers in charge of Travelling Dispensaries. In addition there is a class of Sanitary Inspectors, Chief Sanitary Inspectors and apprentice Sanitary Inspectors.

The qualifications necessary for the superior posts in the Public Health Department are (1) a British Diploma in Public Health and (2) a registrable medical qualification in the United Kingdom. The next superior appointments require an Indian Diploma in Public Health while an Indian Licence in Public Health is required for the other appointments of Rs. 200-400. The medical officers in charge of Travelling Dispensaries, who must all possess an Indian Licence in Public Health, are eligible for promotion to 3rd class Asst. District Medical Officer. 1st class Medical Officer of Health can rise to the post of Asst. Director and the latter to the post of Director of Public Health.

According to the information kindly furnished by Local Governments the U. P. Public Health Department appears to be most highly organised and a model of Public Health work in India. In the U. P. alone in India a regular Food and Drugs Act is in operation while greatest difficulties are being experienced in introducing a similar Act into Bengal.

### Provincial Forest Service and Forest rangerships
(Monthly rates of pay)

For the provincial service the scale of pay is Rs. 250-25-750, with efficiency bar at Rs. 500. There is also a selection grade of Rs. 850. During the probationary period the pay is Rs. 200 only. The pay of rangers is Rs. 90 rising to Rs. 230. Great improvements are being made in the Forest Research Institute and College, Dehra Dun, which provides instruction in forestry in its most advanced branches.

Provincial and Subordinate Forest Service, U. P

### Provincial Agricultural Service

There are at present 20 posts. Pay is on a time-scale of Rs. 250-25-750. Selected Subordinate Agricultural Service men are generally appointed, who are recruited from among the passed students of the Agricultural College, Cawnpore and the Agricultural School, Bulandshahr. The subordinate cadre is 131 and the pay is Rs. 65 rising to Rs. 270 per mensem. The Gardens' service included herein carries a starting pay of Rs. 110, the

qualification therefor being the possession of the final diploma in horticulture of the Agricultural College, Cawnpore. The cadre of Assistant Agricultural Engineers consists of four men on Rs. 250-25-500. The qualification required is a diploma in Mechanical Engineering of the Thomason Civil Engineering College, Roorkee, or equivalent qualification.

### Co-operative Department

**Pay of Asst. Registrars, Co-operative Dept.**

Appointments of Junior Assistant Registrars are made on the recommendation of the Registrar. Candidates have to undergo a short course of training before permanent appointment. Cadre 27, Pay graded, from Rs. 100 on probation, Rs. 140 lowest grade and Rs. 360 highest grade

The co-operative movement is essential to agricultural and economic development of India, but as pointed out by Sir Rajendra Mookerjee in his memorable address to the Asiatic Society of Bengal on Feby : 1926, the Registrars of Co-operative Societies should identify themselves entirely with the people. There appears to be considerable room for improvement in the administration of this department.

Introduced first into Madras and enacted during Lord Curzon's Viceroyalty, the co-operative movement in India has made satisfactory progress during the last 20 years. But much still remains to be done—it being a movement in the right direction—until the whole co-operative work is done by the people for the people, although it is not possible at present to carry the movement forward without a great deal of official help.

## APPENDIX XXIII.

### Provincial Services—(*Contd.*)

(Bombay)

Bombay Provincial Services.

I.—The Bombay Provincial Civil Service is open to all subjects of His Majesty and of a State in India, who have resided for not less than three years before the date of appointment within the limits of the Bombay Presidency or of States under the political control of His Excellency the Governor in Council.

Cadre, Executive and Judicial Branches (Upper and Lower Divisions.)

II.—The service is divided into two branches—the Executive and the Judicial. The Executive Branch is sub-divided into the Upper Division, including Deputy Collectors, and the Lower Divison, including Mamlatdars and District Inspectors of Land Records in the Presidency proper and Mukhtiarkars in Sind. In the Upper Division of the Executive Branch there are about 90 appointments; in the Lower Division about 201 appointments in the Presidency proper and about 87 in Sind, and in the Judicial Branch about 132 appointments as may be notified from time to time, of which about 25 in the Executive Branch, Upper Division, and about 17 in the Judicial Branch will be localised in Sind, Details as to pay and cadre, Judicial Branch, are shown in pp. 261-62.

NOTE.—Admission of Mamlatdars and Mukhtiarkars to the Provincial Civil Service shall not *per se* give them any

claim for promotion to the rank of Deputy Collectors, such promotion being made by Government rigidly by selection as heretofore.

EXECUTIVE BRANCH, UPPER DIVISION

*Presidency proper and Sind.*

III.—Vacancies will ordinarily be filled up by—

Recruitment.

(*a*) selection of persons of high educational qualifications who are not already in Government service ;

(*b*) promotion of selected officers who are already in the Lower Division.

IV.—Notice will be given in the *Government Gazette* of the number of appointments to be filled by selection and of the latest date for receipt of applications. Applicants must produce evidence—

(i) that they will be above 21 and below 25 years of age on the date above-mentioned and that they are eligible for appointment under rule I above ;

(ii) as to the University degrees or other educational distinctions gained by them ;

(iii) as to their proficiency and conduct in the shape of certificates from the heads of such educational institutions as they may have attended, provided that a candidate who has attended a college must produce a certificate from the Principal of such college.

### Excise Department

Excise Dept.

The posts of Superintendent of Excise are filled by promotion from the ranks of Inspectors or by direct recruitment of persons of high educational qualifications.

### Income-Tax Department

Income-Tax Dept.

The regulations framed by the Local Government regarding recruitment of clerks also apply to the Income-Tax Department. There are no fixed regulations for recruitment of Inspectors. For posts of Examiners of Accounts men with knowledge of Accounts, e.g., those who have passed the G.D.A. or the B. Com. are preferred. Income-Tax officers are ordinarily promoted from the grade of Examiners of Inspectors. There are no special rules regarding their recruitment. They are required to pass a departmental examination in Income-Tax Law and Rules, Book-keeping and the Vernacular of the District to which they are posted.

The grades of pay are :—

Income-Tax Officers

300-50/2-900 (in the whole Presidency).

Pay

Bombay.

| | |
|---|---|
| Examiners ... ... | 225-25/2-500 |
| Inspectors ... ... | 200-25/2-500 |
| Superintendents | 230-10-260-12-320 |
| Assistant Superintendents | 170-10 220 |
| Clerks ... ... | 60-4-100-3-160 |
| Bailiffs, 1st grade ... | 100-5-150 |
| Bailiffs, 2nd grade ... | 75-5-100 |
| Stenotypists ... | 125-5-225, |

**Mofussil.**

| | | |
|---|---|---|
| Examiners | ... | 150-15-225 |
| Inspectors | ... | 150-15-225 |
| Sub-Inspectors | ... | 115-5-150 |
| Assistant Examiners | ... | 115-5-150 |
| Bailiffs | ... | 40-2-50 |
| Clerks | ... | 85-5/2-100<br>30-5/2-80 |
| Stenotypists | ... | 105-5-140 |
| Head clerks | ... | 110-8-150 |
| Clerks | ... | 80-5-105 |

**Sind**

| | | |
|---|---|---|
| Examiners | ... | 175-25/2 325 |
| Inspectors | ... | 150-25/2-325 |
| Senior clerks | ... | 105-5-140 |
| Stenotypists | ... | 105-5-140 |
| Clerks | ... | 85-5/2-100<br>30-5/2-80 |
| Bailiffs | ... | 50-3-65 |

### Department of Land Records.

**Land Records.** There is no separate Provincial Service for Superintendents of Land Records in the Presidency, and the District Inspectors and Assistant Inspectors of Land Records are gazetted officers.

## Accounts Department

### Assistant Accounts Officers

Scale of pay is Rs. 500-35-850 (*vide* p. 177.)

**Assistant Accounts Officers.** The appointments are made by the Auditor General by promotion of members of the Subordinate Accounts Service. Promotions to these posts are as a rule made by selection from among senior

Accountants. Seniority and other claims are duly considered, but they are not, *per se*, the deciding factors.

## The Public Works Department

### Provincial Engineering Service

Sanctioned strength 180.

*Method of recruitment.*

Recruitment to this service is at present made from the selected members of the existing permanent Upper Subordinate establishment, selected temporary Engineers and students from the Engineering Colleges recommended for the guaranteed posts.

Cadre and Pay, Provincial and Subordinate Engineering Services.

Scale of pay.

Rs. 250-20-750 with efficiency bar at Rs. 550.

### Upper Subordinate Establishment

Sanctioned strength 274.

Recruitment to this establishment has been practically stopped in view of the orders of the Government of India as contained in their letter No. 192E. A. dated 1st April 1920.

Scale of pay.

Rs. 100-12-460 with efficiency bars at Rs. 208 and Rs. 352.

### Lower Subordinate Establishment

Sanctioned strength 375.

This establishment is under the entire control of the Chief and Superintending Engineers. Recruitment to this establishment is made from qualified men from the Engineering Institutions.

Scale of pay.

Rs. 60-5-150 with efficiency bars at Rs. 90 and Rs. 120.

### Electrical Subordinates

ectrical bordinates.

There is no sanctioned strength for this kind of establishment nor any scale of pay laid down. Subordinates are borne on the temporary establishment according to requirements and each appointment carries with it different rates of pay.

### Indian Police Service (in Bombay)

The pay and pension are the same as those of officers in other provinces. (Rates of pay at pp. 166-68.

dian Police rvice mbay), dre and y.

Recruitment is partly by competition in India and in England, and partly by promotion from the Provincial Service. The present strength of the cadre is—

1 Inspector-General of Police.
1 Commissioner of Police.
4 Deputy Inspectors-General of Police.
39 Superintendents.
31 Assistant Superintendents.

11% recruitment has been reserved for promotion from Provincial Service and 22% for direct Indian recruitment.

**Bombay Police Service.**

Cadre and Pay, Provincial Police Service.

Total cadre 35 appointments—

(i) Three-fourths of the recruitment are by promotion from Subordinate Police Service ; and

(ii) one-fourth is direct.

The pay is as follows :—

Rs. 200-250 for two years of probation.

Rs. 300 for 1st year of confirmation.

Rs. 340-20-500-efficiency bar-520-20-700.

2 selection posts on Rs. 750.

1 selection post on Rs. 800.

**Bombay Civil Service (Judicial Branch)**

Cadre and Pay, Provincial Judicial Service.

The scale of pay is as shown below :—

**Second Class Sub-Judges.**

Rs. 300 for 2 years of probation.

Rs. 350-50/2-650 efficiency bar at 550,

**First Class Sub-Judges.**

Rs. 750-50-850.

Selection grade Rs. 1,000-100-1,200.

**Assistant Judges.**

Rs. 750-75-1,200.

**Small Causes Court Judges at Ahmedabad and Poona**

Rs.1,200 each.

Sanctioned cadre is as follows—

122 second class sub-judges in Presidency proper.

14 second class sub-judges in Sind.

22 First class sub-Judges in Presidency proper (including 3 selection grades).

4 First class sub-Judges in Sind (including 1 selection post).

7 Assistant Judges (including 1 in Sind).

**Jails Service**

**Superintendents.**

rovincial ails Service.

1 Non-I.M.S. Superintendent of Central Prison on Rs.800-50-1,100.

7 Non-I.M.S. Superintendents of District Prisons on Rs.500-25-750.

They are generally recruited from the line of Jailors.

**Jailors.**

| | |
|---|---|
| Selection grade | Rs.300-10-350. |
| Group I ... | Rs.250-5-290. |
| Group II ... | Rs.100-5-170-5-200. |

**Subordinate Judicial Service**

**District Courts.**

abordinate idicial ervice.

| | | |
|---|---|---|
| Civil Sheristedar | ... | Rs. 150-5-200. |
| Criminal Sheristedar. Nazir. Record keeper | ... | Rs. 105-5-140. |
| Deputy Nazir. Correspondence clerk | ... | Rs. 80-5/2-100. |

**1st Class Sub-Judges' Courts.**

| | | |
|---|---|---|
| Clerk of the Court | ... | Rs. 105-5-140 |
| Nazir ... | ... | Rs. 85-5/2-100. |

**2nd Class Sub-Judges' Court.**

| | | |
|---|---|---|
| Clerk of the Court. Nazir. | ... | Rs. 85-5/2-100 |
| Other Clerks in Judicial Court | ... | Rs. 30-5/2-80 |

**High Court and other Judicial Establishments.**

High Court and other Judicial Estbts.

The scales of pay for establishments of the High Court, Original Side, are as follows :—

**(a) Office of the Prothonotary and Registrar.**

| | |
|---|---|
| Supervising Staff | 250-15-325<br>250-10 300<br>110-10-200 |
| Clerks ... ... | 60-4-100-3-160 |
| Court keeper ... | 100 |

**(b) Original Side of the Translator's office.**

First 3 posts—

| | |
|---|---|
| First post ... ... | 775 |
| Second post ... ... | 500 |
| Third post ... ... | 450 |

**(c) Office of the Master and Registrar in Equity, Commissioner and Taxing Master.**

**Upper Division.**

250-10-300
110-10-200

**(d) Office of Chief Clerk, Insolvent Debtor's Court.**

100-10 250.

All other clerks in the High Court—

60-4-100-3-160.

**(e) Establishments in the High Court, Appellate Side.**

**Clerical Establishment.**

| | |
|---|---|
| Office of the Registrar. | 200-20-300-25-400<br>70-5-130-10-200<br>60-4-100-3-160 |
| Translation Branch ... | 175<br>60-4-100-3-160. |

**(f) Establishments in the Small Causes Court, Bombay.**

| | |
|---|---|
| Registrar ... ... | 650-50/2-850 |
| Deputy Registrar ... | 325-15-400 |
| Assistant Registrar ... | 250-15-325 |

**Upper Division.**

| | |
|---|---|
| Chief Clerk ... ... | 190-7/2-225 |
| Accountant and Cashier ... ... | 150-10/2-250 |
| Assistant Cashier ... | 100-5-150 |
| Appraiser ... ... | 150-10/2-200 |
| The Chief Judge's Clerk and The Chief Translator | 200-10-300 |
| Other posts ... | 150-10/2-250 |
| Superintendent ... | 120-7/2-190. |

Lower Division.

| | | | |
|---|---|---|---|
| Clerks | ... | ... | 60-4-100-3-160 |
| Bailiffs | ... | ... | 80-7-150<br>50-3/2-80 |

VI. General, etc. Departments.

There are no rules regarding recruitment to the Provincial Printing and Meteorological Departments. General Depts.

Statements giving the necessary information regarding recruitment and scales of pay to the following Provincial Services are shown elsewhere, pp. 269-70.

(1) Bombay Medical Service.

(2) Non-Indian Medical Service officers of the Public Health Department.

(3) Factory Inspectors and Assistant Inspectors.

(4) Government Printing, Bombay (without rules).

(5) The Bombay Educational Service, (pp. 266-69.)

The Secretary, Bombay Provincial Advisory Committee for Indian students, has not issued any pamphlet containing information which may be useful to students proceeding to Universities overseas.

VII. *Secretariat Establishments*

The posts of Assistant Secretaries are ordinarily filled up by promotion from the Senior Superintendents in the Upper Division. Pay of Secretariat establishments.

**Upper Division.**

| | | |
|---|---|---|
| Senior Superintendents | ... | 475-25-600 |
| Junior Superintendents | ... | 320-20-440 |
| First Assistants ... | ... | 210-15-300 |
| Junior Assistants ... | ... | 120-10-250 |
| Probationers ... | ... | 100 |

**Lower Division.**

| | | |
|---|---|---|
| Clerks, selection grade | ... | 200 |
| Clerks on time-scale | ... | 60-4-100-6--190 |
| Reservist ... | ... | 60 |

*Stenographers*, Rs. 150-25-300.

*Section-typists* on piece work.

The Establishments under each Secretary generally form units.

VIII. *General.*

The Government of Bombay have made it a rule that for all appointments made by the Local Government or authorities subordinate to it, preference is to be given, as between equally qualified candidates, to persons who are inhabitants of the Bombay Presidency or of Indian States in political relations with the Government of Bombay.

**Bombay Educational Service**

**Provincial Educational Service.**

Appointments to the Bombay Educational Service are made directly or by promotion from the Subordinate Educational Service. For vacan-

cies occurring in the Collegiate branch of the Bombay Educational Service direct recruitment is generally considered preferable. No hard and fast ratio has, however, been fixed in respect of direct recruitment and promotion from the lower service. The aim kept in view in this matter is that as far as possible men appointed to the Collegiate branch of the Subordinate Educational Service shall be sufficiently well qualified to admit of their being promoted to the Bombay Educational Service when a suitable vacancy occurs, as otherwise there is always a danger of men of inferior qualifications being promoted by reason of length of service. On the other hand, Bombay Educational Service vacancies are not necessarily, nor even generally, filled by promotion from the Subordinate Educational Service. The principle laid down is that no one shall ordinarily be appointed to the Bombay Educational Service unless his qualifications are in themselves sufficient for that service and, unless there is in the Subordinate Educational Service a man who is eminently fitted for the Bombay Educational Service both by his qualifications and by the record of his work done, it is preferred to take in a new man with really good qualifications.

2. Posts in the Bombay Educational Service are divided into two classes, major and minor, generally according to their status and according as their holders are or are not in sole charge of

the subjects they teach. Incumbents of major posts are designated Professors while those of minor posts are designated Lecturers.

For this service the principle of a time scale with a selection grade has been adopted. The following scale has been laid down :—

Cadre, Pay, etc.

| | | | |
|---|---|---|---|
| (*a*) | Ordinary time-scale | ... | Rs. 250-20-(annual)-650. |
| (*b*) | Selection grade | ... | Rs. 650-30-800 |

In the ordinary time-scale there is a bar at Rs. 550 which serves both as an efficincy and as a responsibility bar. The efficiency bar is strictly applied to holders of all major posts and no officer holding such a post is allowed to pass it unless he has proved himself to be thoroughly efficient. The responsibility bar is applied to minor posts and no officer holding such a post is allowed to pass it unless he is first appointed to a major post. Selection grade appointments are made up to twenty per cent. of the total cadre of the service but Government reserve to themselves the right not to fill up a selection grade if a suitable officer of adequate capacity and experience is not available.

The initial pay of persons recruited directly to the Bombay Educational Service is ordinarily fixed at the minimum of the time-scale of the service. In special cases, however, men entering the service above the age of 25 are given the

benefit of one or more annual increments up to a limit of 10 in accordance with the number of completed years by which, on admission, their age exceeds 25. This, it is considered, enables men of special qualifications and experience being recruited for vacancies in which youth plus merely academic qualifications do not serve. Each such case is dealt with on its merits.

The number of posts in the Bombay Educational Service is 114 but of these posts 71 are major posts while 43 are minor posts.

The above lucid note and the preceding one at pp. 245-46 on Educational Service may be read with advantage by all young men with academic degrees in any province, who, it is feared, have not the slightest idea of what they are aiming at, beyond a vague notion that they would like to be a "professor."

| Services. | Recruitment. | |
|---|---|---|
| *Bombay Medical Service.* | *Recruited from the Graduates of the Grant Medical College*, i.e., *M.B.B.S.* | Bombay Provincial Medical, Public Health and Factory Services. |
| Non-Indian Medical Service Officers of the Public Health Department. | Recruited from persons possessing Public Health Diploma. | |
| Factory Inspectors and Assistant Inspectors. | No special qualifications for recruitment are laid down, but posts are advertised and men possessing special technical knowledge with previous experience of Factories are appointed. | |

## Scale of pay of Bombay Medical Service

*Rs. 200-40-400-50-950.*

### Bombay Public Health Department

Pay

| Year of Service. | Scale of pay. Rs. |
|---|---|
| 1-2 probation ... ... | 500 |
| 3-5 ... ... ... | 600 |
| 6-10 ... ... ... | 700 |
| 11-15 ... ... ... | 800 |
| 16 and over ... ... | 900 |
| Approved service of over 20 years ... | 1,000 |

### Factory Inspectors

2 Inspectors on Rs. 500-40-900.

3 Assistant Inspectors on Rs. 300-25-500.

### Government Printing (Bombay)

Pay, Printing Dept.

| | Scale of pay. Rs. |
|---|---|
| Superintendent Government Printing and Stationery, Poona ... | 800-60-1,400 |
| Manager, Government Central Press, Bombay. | 600-30-900 *plus* Rs. 100 duty allowance and free quarters. |
| Manager, Yeravda Prison Press ... | 500-25-750 (with free quarters). |
| Manager, Commissioner's Press, Karachi. | 450-20-650 |

# APPENDIX XXIV.

## EDUCATION

### Indian Universities.

#### List of Degrees and Diplomas.

(*Note.*—Those with asterisks are Diplomas)

Indian University Degrees and Diplomas.

(Arts) (1) B.A., (2) B. Com., M. Com., M.A., D. Litt, Ph. D., D.S.E., B.O.L., M.O.L., D.O L. ;
(Science) B.Sc., B.Sc. (Agr.), M.Sc. (Agr.) B.Sc. (Forestry), B.Sc. (Mining), B.Sc. (Metallurgy), B.Ag., M.Sc., D.Sc. ;
(Teaching) *L.T., B.T., B.Ed., M.T. ; (Law) B.L., L.L.B., M.L., L.L.M., D.L., L.L.D. ;
(Medicine) M.B., B.S., *L.M.S., M.S., M.D., M.O , *L.P.H. *D.P.H., *D.T.M., B. Hy., D. Hy. ;
(Engineering) B.E., B.Sc.(Engineering), D.Sc.(Engineering), M.C.E.

#### Degrees obtainable from each University.

1. **Aligarh**—B.A. and B.Sc. (2 years' course after Intermediate of an Indian University). Further courses leading to M.A., M.Sc. and L L B.

2. **Allahabad.**—B.A., M.A., D.Litt., B.Sc ,M.Sc.,D.Sc., L.L.B., L.L.M., L.L D., L.T., B. Com.

3. **Benares.**—B.A., M.A., D.Litt., B.Sc.(Engi.), B.Sc. (Mining), B.Sc.(Metallurgy), L.L.B., L.L M., L.L D., L.T.

4. **Bombay.**—B.A., M.A., B.Sc., M.Sc., B. Com., M. Com., L L.B., L.L.M., M.B., B.S., B.Hy., M.D., D.Hy., M.S., B.Ag., B.E., M.C.E.

5. **Calcutta.**—B.A., B. Com., M.A., Ph D., D.S.E., B.Sc., M.Sc., D.Sc., B.T., B.L., M.L., D.L., M.B., M.D., M.S., M.O., D.P.H., B.E., B.Sc. (Engineering).

6. **Dacca.**—B.A., B.Sc. (Ord.), B Sc.(Hons.), M.A., M.Sc., L.T., B.T., M.T., B. Com., B.L., M.L., Ph.D., D.Sc., D.L.

7. **Delhi.**—B.A., B.Sc., M.A., M.Sc, Ph.D., D.Litt., L.L.D.

8. **Lucknow**—B.A., B.Sc., B. Com., M.A., M.Sc., L.L.B., M.B, B.S.

9. **Madras.**—B.A., B.Sc., B.A.(Hons.) B.Sc.(Hons.), M A., M.Sc., D Sc., B.Sc.(Agr.), L.T., B.L., M.L., L.L.D., M.B., B.S., L.M.S., B.San.Sc., M.D., M.S., B.E., M.O.L.

10. **Mysore.**—B A., B Sc., B. Com., B.E., M.B., B S., M.A., D. Litt., D.Sc.

11. **Nagpur.**—B.A., B.Sc., M.A., M.Sc., D.Sc., L.L.B., L.L.M., L.L.D.

12. **Osmania.**—B.A., M A., L L.B.; also Diplomas of Asst. Surgeon and Sub-Asstt. Surgeon, Upper and Lower Subordinate civil and mechanical Engineering and 1st and 2nd grade Pleaderships.

13. **Patna.**—B.A., B.Sc., B.L., B.Ed.

14. **Punjab.**—B.A., M.A., D. Litt., B.Sc., M.Sc., D.Sc., B.Sc.(Agr.), M.Sc.(Agr.), L.L.B., L.L.D., L.L.M., M.B., B.S., M.S., M.D., B.T., B.O.L., M.O.L., D.O.L.

15. **Rangoon**—B.A, M.A., B Sc., M.Sc., B.Sc. (Engineering), B.Sc. (Forestry), B.L., M.B, D. Litt.

In Arts and Science it is usually a two years' course after matriculation, leading to an Intermediate examination of an Indian University. This is followed by a further two years for a degree, or altogether 4 years after matriculation against 3 years for a degree in a British University.

## University Courses

The Indian University Matriculation is considered to be inferior and according to the Calcutta University Commission recommendations the present Intermediate courses will be merged in matriculation, the ordinary degree course being then covered by two years and the Honours degree by 3 years. Some Indian Universities have already adopted these recommendations and the question is under consideration at the Calcutta University. The diversity of rules is observed not only in Arts and Science, but also in Applied Science, such as Medicine and Engineering, similar diversity is noticeable. A medical degree is generally a five years' course in a British University and so in India. But at the Calcutta University it is a six years' course. Similarly, Engineering is a three years' course in England whereas it covers either 3 or 4 years in India.

Academic period for a Degree course in India and in England.

Diversity of rules.

It is perhaps argued that it is possible to work hard in cold countries and that a three years' study there is equivalent to 5 years in the tropical climate of India. The writer's experience, however, is that the time factor is not so important as the personal equation. Under a good teacher and with undivided attention a much reduced time amply suffices and if any reform is needed it may be towards *(a)* obtaining capable teachers and *(b)* revising the time-table of courses in such a way as to extract more practical work and application

Efficiency of teaching more dependent on the teacher than on the time factor.

of intelligence and of general knowledge from students than mere cramming of notes and text books.

**Industrious Indian students.**

Indian students are generally industrious and intelligent, struggling hard against poverty and malnutrition, and if their labour happens to be well-directed by really able teachers, a great deal of human energy may be saved, resulting in an improvement of Indian manhood against apparent waste either under the present system of training or by the proposed prolongation of courses. According to the basic principles discussed in this volume only students of ability and wealth may be encouraged to enter upon University careers, and while the able few will quickly shine and raise the status of the University, the rich hundreds may prolong their courses and swell the University coffer. The writer is exceedingly thankful to the Registrar of the Calcutta University for the complete information obtained from him as regards the degree courses at this University and hopes that his humble suggestions may receive the consideration of the University authorities.

### Lines of Educational Reforms

**Views of H. E. the Governor, Bengal and Sir Rajendra Mookerjee.**

Incidentally we may refer here to the most sound views recently expressed by Sir Rajendra Mookerjee in his presidential address at the annual meeting of the Asiatic Society of Bengal held on Feb: 1, 1926, and to His Excellency the Governor's appreciation of India's more mystic and

unselfish culture. If we take these weighty opinions to constitute the last word on the subject—and it may be pointed out that they are in complete support of the basic ideas expressed in this book, and as such these opinions are appended hereto (Appendix xxvi)—we must at once remodel our educational system on a basis of free primary education with full facilities for the masses just to introduce them to reading, writing and arithmetic and to induce in them a craving for knowledge in order to broaden their outlook generally and to improve their respective *ancestral* vocations particularly. The people must understand that this enlightenment should come first chiefly from their own exertions and from co-operative work in their villages. Demonstrations and free literature of practical advice will have to be next arranged for, and finally the most promising of the peasantry and other labouring classes may be periodically picked and awarded scholarships only to enable them to undergo a higher training in technological subjects. These trained men, on return to their villages, will not only assist in improving their village agriculture, crafts and industries, but also in starting organised industries in co-operation with the middle class people at industrial centres, who have already undergone regular courses of technical and technological instruction. A programme of this nature will solve the educational requirements of 90 p.c. population in rural areas and of a portion of the 10 p.c. in urban areas. The balance that will be

**Free primary education.**

**Higher training classes.**

**Definite programme.**

left consists of the existing literate middle and wealthy classes, the best of whom may pass competitive service examinations, and the remainder employed in trades and professions. Vocational education without a clear and a definite aim and a cut and dry programme is meaningless and is as productive of chaos as the existing purely literary education for all classes.

### Need for extending Primary Education

According to the latest report on Education in India the extent of University, secondary and primary education during 1923-24 was as follows :—

**Statistics of Education in India.**

Number of Pupils.

| | | Primary | |
|---|---|---|---|
| University | Secondary | Upper | Lower |
| 61,000 | 6,36,000 | 6,78,000 | 61,37,000 |

Added to the number of graduates, undergraduates and non-matriculates who have already left colleges and schools, and who are not apparently included in the above figures, the statistics of literacy in India cannot be regarded so impressive as to present a serious problem for statesmanship and to offer grounds for unemployment among the educated middle-classes. As explained in the eight chapters of this book, some of the root causes of the present difficulty and of the impoverishment of rural areas appear to be (1) the preference given to literary education and (2) the encouragement in the public services of a due representation of all communities with the result that all classes from peasants

**Root cause of the break-up of the whole social system.**

upwards have either left, or have to leave, their *ancestral* vocations in consequence of their pursuit after a literary training or after better facilities and sanitation in towns, and the exodus from the village to the town has consequently been inevitable. There are other causes as well, which have acted and re-acted on one another. It is true that, under the best of literary and vocational education given to us with the best of intentions, several people have held high and comfortable positions and have risen to eminence. But they have led to the break-up of the whole society instead of to its progress. Unselfishness has been replaced by selfishness and the whole outlook has been poisoned. A drastic surgical operation is, therefore, necessary, or in lieu thereof we must inject primary education into the whole population and hold University and secondary education in abeyance, if necessary, until the threatened suppuration of the entire social fabric is arrested. On the lowest computation there are no fewer than 70,000 villages in India, and if we send one graduate to each village, or one educated Anglo-Indian to each industrial centre, for extending primary education, all unemployment for the present may disappear. In order of urgency this problem is more emergent than University reforms or multiplication of technical schools and colonisation schemes without a programme of the kind referred to in p. 275. It is time that we utilised the advantage of Sir Rajendra's outstanding genius and

**Need for drastic reforms.**

**A simple method of reducing middle-class unemployment.**

unique experience and of His Excellency the Governor's sympathy with Indian ideals to solve this educational problem instead of leaving it to University Pundits. A representative committee of practical men of wide experience along with the ensuing Royal Agricultural Commission is what is badly needed.

There is, however, one thing which may be said against Indian ideals. Indian habits are generally most uneconomic, not through ignorance in its ordinary sense, but from a perverted and false notion of philosophic principles. The economic methods of the West, as exhibited by their intense activities in respect of material, moral and humanitarian progress, set us a noble example

Since 1919 the writer has given his closest attention to the subject, although more than 25 years ago he wrote his first paper on education, which is referred to in pp. 32 and 193. He discussed this subject with various classes of people both in India and in England, and as regards the Anglo-Indian community he had his facts and figures from Dr. H. W. B. Moreno, M. L C., who has a wide grasp of the subject and to whom the writer tenders his grateful thanks for the assistance rendered.

**Services rendered by Dr. H. W. B. Moreno, M. L. C.**

## APPENDIX XXV.

### Commerce and Industry.

Broadly, the principal factory industries in India, arranged in ascending order of importance, are :— (1) Paper Mills, (2) Flour Mills, (3) Cement Works, (4) Tobacco Factories, (5) Motor and Coach Building Works, (6) Rope Works, (7) Dye and Indigo Factories, (8) Metal Works, (9) Kerosine Tinning and Packing Works, (10 Stone Works, (11) Tanneries and Leather Works, (12 Woollen Mills, 13 Tile and Brick Factories, (14 Petroleum Refineries, (15) Oil Mills, (16) Sugar Factories, (17) Arms and Ammunition Factories, 18) Saw Mills, (19) Dockyards and Post Trust Workshops, (20) Jute Presses, 21) Printing Presses, (22) Tea Factories, (23) Rice Mills, (24) Engineering Workshops, (25) Railway and Tramway Works, (26) Cotton Gins and Presses, (27) Jute Mills, (28) Cotton Spinning and Weaving Mills.

**Principal industries in India.**

Of the above large industries under 28 heads, the cotton mills which number about 272 in British India, 37 in Indian States and 3 in French Settlements and which employ daily over 3 lakhs operatives, represent the biggest factory industry and head the list in importance, in the amount of capital invested and in the value of output. In respect of the number of persons engaged in each class of factory industries, Paper Mills employing about 5,000

people stand last in importance at present. But with the growth of literacy in India,—the present stage as shown in page 276 being quite inadequate for the vast population of India,—there is a large future before this industry as well as for Printing Presses which now stand 8th in the order of importance based on the average number of persons employed daily in the respective industries. This ascending scale of importance, as disclosed in the foregoing list, may be graphically represented by coloured circles of varying sizes. According to the information available, the latest being that for the year 1923, about 15 lakhs of people are employed daily by the different classes of large industries in India. These industries which include Colliery Workshops but not Mines, are exclusive of small factories which employ daily less then 10 hands and which consequently do not come under the operation of the Indian Factories Act

**Graphic representation of industries.**

**Mineral Wealth of India**

As regards Mines the annual report for 1924 shows that during that year the daily average number of persons employed on the mines was 258,217 which is an increase of 10 per cent. on the figures for the preceding year. Of these persons 167,719 persons worked underground and 90,498 on the surface; 164,402 were adult males and 87,434 were adult females.

Those employed in coal mines numbered 187,088 which is 4,487 more than those employed in 1923, the chief coal fields being in Bihar and

employing over a lakh of persons daily in that area alone. The number of women employed below ground in all mines increased from 52,676 to 60,375. The total number of women employed underground in coal mines is estimated at 35,000.

The Chief Inspector suggests that the opposition to the proposals to prohibit employment of labour underground is becoming weaker, and he adds: "Mining labour at the moment is plentiful and there would probably be less trouble now than at any time for many years in replacing women workers in mines."

Satisfactory progress has been made in the task of improving the housing of colliery labour in the Jharia coalfield and most of the worst houses have been eliminated. Appreciable increases in output are reported in the case of nearly all minerals. The output of coal increased by 1 million tons and now stands at 20,256,000 tons. The use of coal-cutting machinery is steadily increasing. During 1924 nine per cent. of the coal output was obtained by machines.

Mineral wealth of India.

The output of iron ore increased by 48 per cent. the output of manganese by 22 per cent. and the output of mica by 28 per cent. More notable than any of these increases was the increased production of bauxite The output for 1924 was nearly three times that of 1923 There were 233 fatal accidents during the year 1924, and they involved the loss of 281 lives, including 37 women. 189 fatal accidents occurred in coal mines.

**Labour in mining areas.**

The majority of the labour population in factories and mines in India are agriculturists and as they generally migrate to their villages during the agricultural seasons, great difficulties are often experienced in maintaining a steady labour supply and uniform output. Against the disadvantage there is the unique advantage of these labourers (*a*) to fall back upon their farms in times of trade depression, thereby avoiding unemployment, and (*b*) to afford them a change from the environment of industrial centres which are often described as demoralising.

Turning to the large industries already referred to in page 279 we append below the following details as far as available, hoping that they will be carefully examined by all persons interested in them with the result that new avenues of employment may be found for the unemployed and new industries started by capitalists and co operative workers.

## Classes of large Factories

(*Note.* Most of the lac and mica work in India and many of the industries mentioned here are carried on as small industries. According to the figures given, most of these industries may be largely developed.)

| | Total number in India. | | Total number in India. |
|---|---|---|---|
| (i) Textiles— | | (i) Textiles – (*contd.*) | |
| Clothing Agencies | 5 | Jute mills ... | 89 |
| Cotton mills ... | 312 | Silk mills (including filatures) ... | 12 |
| Hosiery factories | 10 | | |

| | Total number in India. |
|---|---|
| (i) Textiles—(*contd.*) | |
| Woollen, carpet & shawl weaving establishment .. | 10 |
| Woollen mills ... | 14 |
| Miscellaneous ... | 25 |
| (ii) Minerals & Metals— | |
| Aluminium factories ... | 3 |
| Colliery workshops | 7 |
| Iron, brass and steel foundries... | 84 |
| Kerosene tinning & packing works | 29 |
| Lock and cutlery works ... | 3 |
| Gold washing works ... | 1 |
| Metal works ... | 33 |
| Mica works ... | 1 |
| Petroleum refineries (including oil pumping stations) ... | 16 |
| Miscellaneous ... | 10 |
| (iii) Engineering and Transport— | |
| Dockyards ... | 21 |
| Electrical Engineering work ... | 30 |
| Electrical generating and transforming stations | 28 |
| Engineering workshops ... | 231 |
| Harbour works ... | 2 |
| Motor works and coach building works ... | 92 |
| Railway workshops, etc. ... | 109 |
| Shipbuilding & engineering works | 8 |
| Tramway works... | 10 |
| Miscellaneous ... | 2 |
| (iv) Food, drink, and tobacco— | |
| Bakeries ... | 3 |
| Biscuit factories .. | 4 |
| Breweries ... | 8 |
| Coffee works ... | 16 |
| Dairy farm ... | 2 |
| Distilleries ... | 24 |
| Flour mills ... | 60 |
| Ice, mineral and aerated water factories ... | 67 |
| Rice mills ... | 1088 |
| Sugar factories ... | 38 |
| Tea factories ... | 655 |
| Tobacco factories | 17 |
| Miscellaneous ... | 42 |
| (v) Chemicals, dyes, etc.— | |
| Bone mills ... | 22 |
| Chemical works ... | 20 |
| Dye works and indigo factories ... | 87 |
| Lac factories ... | 15 |
| Oil mills ... | 225 |
| Paint works ... | 6 |
| Soap factories ... | 7 |
| Rosin and Turpentine factories .. | 3 |
| Miscellaneous ... | 9 |
| (vi) Paper and printing— | |
| Paper mills ... | 8 |
| Printing presses ... | 247 |
| Book binding ... | 1 |
| Miscellaneous ... | 1 |

**Large industries in India and total number of factories in each case.**

| | Total number in India. |
|---|---|
| (vii) Processes relating to wood, stone & glass— | |
| Carpentry ... | 16 |
| Cement works ... | 9 |
| Furniture workshops ... | 6 |
| Glass factories ... | 12 |
| Potteries ... | 11 |
| Saw mills ... | 183 |
| Stone works ... | 6 |
| Tile and brick factories including Soorki mills | 68 |
| Lime works ... | 5 |
| Miscellaneous ... | 4 |
| (viii) Processes connected with skins and hides— | |
| Leather works ... | 11 |
| Tanneries ... | 28 |
| Miscellaneous ... | 2 |
| (ix) Gins and presses— | |
| Cotton ginning, cleaning & pressing works ... | 1663 |
| Jute presses ... | 110 |
| Miscellaneous ... | 3 |
| (x) Miscellaneous— | |
| Aeroplane workshop ... | 1 |
| Arms and ammunition factories | 6 |
| Arsenals factories | 7 |
| Artificial Limb factory ... | 1 |
| Belting works ... | 1 |
| Brush works ... | 3 |
| (x) Miscellaneous—*contd.* | |
| Cable factory ... | 1 |
| Canal foundries & workshops ... | 5 |
| Canning and condiment factories | 5 |
| Forage factories... | 8 |
| Galvanizing works | 3 |
| Gas works ... | 10 |
| Gun carriage factory ... | 1 |
| Jewellery workshops ... | 3 |
| Manure works ... | 4 |
| Match factories ... | 6 |
| Mathematical instrument factory | 1 |
| Mints ... | 2 |
| Municipal workshops (including water works) ... | 32 |
| Packing box factories ... | 8 |
| Port Trust workshops ... | 4 |
| Reed and comb factories ... | 2 |
| Rope works ... | 16 |
| Rubber works ... | 7 |
| Sappers & Miners workshop ... | 1 |
| Seed factories ... | 2 |
| Stationery works | 3 |
| Stores works ... | 2 |
| Surgical instrument factories... | 5 |
| Telegraph works | 2 |
| Umbrella factory | 2 |
| Miscellaneous (not enumerated above ... | 18 |

## India's Trade

The next important point is India's Trade which employs a large number of people in various kinds of work connected with it and which can employ a still further number if we concentrate our attention on the subject. It is impossible to do justice to it in a small volume like this and with a view to stimulating interest in the matter we may refer to a Note by the Collector of Customs, Calcutta, on the trade of the port with foreign countries in August 1925.

### Imports

The value of principal imports with variations as compared with August 1924, shewn by a plus or minus sign prefixed, were as follows :—

| Imports | In lakhs of rupees |
|---|---|
| Cotton goods ... ... | 2,25 (−60) |
| Sugar ... ... ... | 92 (+ 4) |
| Iron and steel ... ... | 46 (−12) |
| Machinery and millwork ... | 39 (level) |
| Mineral oil ... ... | 34 (+11) |
| Other metals ... .. | 20 (+ 5) |
| Hardware ... ... ... | 17 (+ 1) |
| Instruments, electrical ... | 8 (+ 2) |
| Railway plant and rolling stock ... | 8 (− 4) |
| Liquors ... ... ... | 7 (level) |
| Glass and glassware ... ... | 6 (level) |

Imports of cotton goods continued poor, the yardage of piece-goods declining from 77

million yards to 67 million yards and the value from Rs. 2,85,00,000 to Rs. 2,25,00,000. The quantity of refined sugar advanced from 32,801 tons to 48,496 tons and the value from Rs. 88,00,000 to Rs. 92,00,000. Imports of iron and steel and railway plant and rolling stock showed no recovery. The marked increase shewn against mineral oil was due to heavy imports of kerosene, mineral and other kinds chiefly from Borneo and the United States.

### Exports

In exports the fluctuations in principal articles when compared with the trade in August 1924, were as follows :—

| Exports | In lakhs of rupees |
|---|---|
| Jute manufactures ... ... | 5,73 (+98) |
| Tea ... ... ... | 2,71 (+18) |
| Jute, raw ... ... ... | 1,80 (+1,40) |
| Hides and skins ... ... | 49 (+29) |
| Linseed ... ... ... | 48 (level) |
| Grain, pulse and flour ... ... | 46 (− 7) |
| Lac ... . ... | 43 (+ 2) |
| Pig iron ... ... ... | 16 (+ 4) |
| Opium ... ... ... | 14 (− 5) |
| Cotton, raw ... ... | 12 (+ 1) |
| Mica ... ... ... | 6 (level) |

### Jute Manufactures

Jute manufactures, as usual, continued to head the list of principal exports. The total tonnage

shipped advanced from 79,105 tons to 84,943 tons and the value from Rs. 4,75,00,000 to Rs. 5,73,00,000, the United States being the best purchasers of the cloth and Australia and Chile taking the largest number of bags. Compared with the huge profits made by the Jute manufacturers, the earnings of the cultivator and of the weaver are extremely meagre. The condition of the peasant labourers may be largely improved by their capitalist employers and the lurking danger of a serious menace to jute industry from a rival in Java may thereby be timely averted.

The quantity of tea shipped advanced from 25 to 32 million lbs. and the value from Rs. 2,53,00,000 to Rs. 2,71,00,000, the bulk of the shipments going to the United Kingdom.

There was a marked improvement in the demand for raw jute, as compared with the corresponding period last year, the quantity shipped advancing from 11,519 tons to 34,813 tons, and the value from Rs 40,00,000, to Rs. 1,80,00,000. Germany, France and the United States were the principal buyers.

Good business continued to be done in hides and skins, Germany, as usual, sending large orders for the former and the United States for the latter. A smart revival is recorded in exports of linseed after the heavy falling off reported in the previous month. The United Kingdom, the principal customer, greatly increased her requirements.

The trade in grain, pluse and flour continued depressed. Lac, though not in such great demand as in the previous month, still shewed an improvement over the corresponding period last year, the United States securing the bulk of the trade. Exports of pig iron increased from 16,898 tons to 34,827 tons, both Japan and the United States sending big orders.

The facts and figures given concisely in this Appendix with regard to India's industries and trade are not only informative even in their skeleton forms, but may be used as great eye-openers, if the readers care to find how to utilise the information contained. The Commercial Intelligence Department Library which was constituted in 1919 into a technological library of reference in Calcutta, is a mine of information. The Library contains at present over 10,000 volumes, about 300 journals and market reports and may still largely increase its usefulness with some additional money. The present average daily number of readers attending this Library ranges from 80 to 90; the overflowing student community at Calcutta, who are generally pursuing unprofitable careers and swelling the class of the unemployed, would do well to spend most of their times either in this or in the Imperial Library which is another important asset of Calcutta, and which the city will be poorer indeed to lose.

## APPENDIX XXVI

### Economic Condition of the People

#### Education the Crux of all the Problems of India

In his presidential address to the Asiatic Society of Bengal on February 1, 1926, irS Rajendranath Mookerjee selected a subject which was agitating the public mind in India at the present moment, namely, the economic condition of the people. He did not proceed with an abstract discussion of theories and principles, but said what his experience as a business man who has frequently come into contact with both the cultivators and the middle classes, emboldened him to express what he felt on this complicated subject. Another reason which weighed with him in selecting this subject was that the present economic condition of India required immediate atenttion and study in order that practical steps might be devised.

Need for immediate attention.

Sir Rajendra, continuing, said :—The aim of an ideal economic policy should be to provide every man and woman with sufficient means of subsistence, leaving a well-defined period of leisure to be devoted to things which do not directly contribute towards earning a livelihood. It is only after the physical needs of man are satisfied and secured that he can participate in the gradual moral, political and social uplift which should characterize

An ideal economic policy.

a progressive society. The objective of a sound economic policy should be the improvement of the material conditions of living, that is, to provide ways and means for every man to obtain a reasonable subsistence with only so much effort as will leave him ample leisure and opportunity to devote to things not directly remunerative in the shape of material comforts. The problem, therefore, is not merely to provide an abundance of material goods suitably distributed but also to provide plenty of leisure and opportunity for one and all. Economics, as you know, generally deals with the production and consumption of commodities. Almost every authoritative treatise on this vital subject deals largely with the factors of production. But these factors ignore the essential purpose of an ideal economic policy. Man has more than animal needs and to neglect these is to ignore the fundamental conception which should underlie any scheme of human betterment.

### The facts about India

**Poverty of peasantry.**

India is entering into an era of industrial development. It behoves us to profit by the experience of the West and avoid the shoals and pitfalls in which Western industrial history abounds. Let us look briefly at the "facts" about India. Of the population of India 72 per cent. are dependent upon agriculture, directly or indirectly. The peasant forms the biggest problem of Indian economics. In formulating any scheme or plan for his general

uplift, essential factors, such as his poverty and ignorance, his material condition, his modes of living, his habits of mind in relation to his environment, must be taken into consideration. We must recognise that his poverty precludes notions of thrift and that through ignorance he is at times foolishly extravagant. He does not hesitate to incur expenditure to the utmost limit of his credit on pilgrimages or on ceremonial occasions like the marriage of his children or the funeral of his parents. He is illiterate but he is not entirely uneducated in the cultural sense. He possesses a fine comprehension of traditions and customs, his social heritage is of a distinct cultural refinement though often obscured by gross superstition and ignorance. He is unambitious but his desires and instincts are not by any means primitive ; he can and does feel intuitively, when given the opportunity, the call of culture and refinement. His knowledge is limited, but his vision, though dimmed by generations of indigence and poverty, is often directed towards far away spiritual lights. The folk tales, symbolic of village life, carry an appeal to him as perhaps nothing else does. At times he forgets his sordid surroundings amid the splendour of of spiritual dreams. Such are his social and cultural heritage and one cannot really ignore this part of his life in a scheme of reconstruction of his material conditions. We have further to keep the fact constantly before the mind that the Indian ryot does not like, and probably never will like, an

**Ignorance leading to occasional extravagance**

**Social and cultural heritage** **(cf. p. 26.)**

utterly individualistic economic structure. The notion is entirely repugnant to Indian ideas, particularly to the Hindu scheme. Communal living, mutual help, co-operative team-work—these habits are still at work in the simple economy of our villages.

Individualistic economic structure abhorent (cf. pp. 23, 25, 26.)

### The Peasant Problem

The human aspect of the Indian peasant problem should be placed alongside the facts about the agricultural capacity of India, her productive capacity per acre, her dependence upon extra-human agencies like the monsoon, for proper and timely harvests. We should also keep in view the simple credit system of the village—the habit of getting into the clutches of the money-lenders, of borrowing before harvesting and borrowing again to sow in the next season. Climatic factors, system of land tenure and conditions of labour on the fields should also be taken into consideration in drawing up any economic scheme for the peasant. Scientific research has to reveal a great field for agricultural development and a prospect of much greater returns than have been obtained hitherto, but they are only partially realised and we must take concerted measures to make them common property. It is, therefore, imperative for the Imperial Government to constitute an effective central organisation to achieve this result with the harmonious co-operation of all the provinces.

Agricultural development by scientific research (cf. pp. 35, 37, 38, 39, 46, 57, 52, 102, 142, 148, 197)

The introduction of factories in big towns has provided an alternative means of livelihood for the

half-starving cultivators. Migration from villages into large industrial towns has recently assumed big proportions, and in as much as the migration is seasonal, it has given rise to complications in regard to the supply of industrial labour. We realised that this migration is seasonal because of the people's deep rooted attachment to the soil and that dire want only drives them to the towns. When the call of the harvest comes or when employment in the mills diminishes, they—one and all —tread their way back to their villages and to their little plots of land. Town and country are interdependent aud nourish each other, the former providing manufactures and the latter food. The poverty of one necessarily brings about, in the end, the poverty of the other. The development of the manufacturing industries need not, by any means, lead to the neglect and decay of the nation's agriculture.

Industrial centres in towns
Cf. p. 282.

### The Bhadralog

When we come to the middle class we find them consisting largely of Bhadralog who are not cultivators. Time was when they were content with a modest living and finding literacy a good asset they flocked to Government and commercial and railway offices, seeking employment as clerks. Conditions were comparatively favourable for two or three generations but as soon as the supply of the half educated clerks exceeded the demand, the avenues of service became narrow and the scramble

for employment reduced their hire price, the class as a whole became demoralised. Living for two or three generations in the ease of town life has weaned them of their love for the villages and at the same time has made muscular toil distasteful and even abhorent to them, The educational opportunities so far open to them have been along one dead uniform line. Very little effort has hitherto been made to place vocational or industrial training within easy reach of the poor middle class. The multiplication of clerks, therefore, goes on apace and poverty, more severe in its incidence than in the case of peasant, stares them in the face. We have to remember that while the peasant ekes out a precarious living by the toil of his muscles, he remains physically fit and can turn his hand to other unskilled heavy work. For the average clerk out of employment there is no alternative and he cannot turn easily to any other occupation. This is the problem of the poor Bhadralog. To be able to help him, to solve the riddle of poverty, we need to increase not merely the amount of employment available for men of his class, but also to understand his psychological equipment, his modes of thinking, his aversion to physical labour. These facts should be considered in relation to the opportunities open to him. In my opinion gradual reform in his outlook can be achieved only by altering the educational schemes of training and by widening the opportunities within his reach.

**Evil of education on a dead uniform line (cf. pp. 48, 128, 129, 142.)**

**Middle class suffering more acute than that of peasantry (Cf. p. 138.)**

**A change in outlook imperative (cf. p. 135.)**

### Need for Universal Primary Education

I feel rather diffident to express any definite views upon the remedies to be adopted for the distressing conditions of the masses of India. A few points stand out prominently and to my mind these indicate the general lines along which reforms may, with advantage, be initiated. Education is, I believe, the crux of all the problems of India. What has struck me most forcibly is the progressive impoverishment of our rural areas and a gradual increase in the cost of living. I have already commented upon the material and the psychological make-up of the rural classes. Poverty and destitution have overtaken them in their struggle for bare sustenance, and ignorance, from want of education, prevents them from struggling out of their present deplorable plight. To remove this ignorance, to bring light and understanding to each one of the homes in the villages, to teach them the folly of imprudence and inform them of the viciousness of the money-lender's grip—these are the immediate objects which should engage the attention of our administrators. Universal primary education of the right type for the masses is the chief desideratum today in India. Any education that is to attract the mass of the people must have a direct and evident bearing upon the activities of their adult life. Agriculture is the fundamental, if not the most important, industry of any people. In agriculture, by far our greatest industry, progress cannot be

Education the crux of all the problems of India (cf. pp. 15, 27, 35, 126, 134, 141 146.)

Agriculture the fundamental Industry (cf. pp. 35, 51.)

achieved until the peasants are enlightened and begin to realise the benefits of systematic production, mutual self-help, and scientific cultivation. They will not do so unless we spread throughout the length and breadth of the country the desire for education and provide ample facilities for meeting it. Knowledge will cleanse the ryot of his pernicious habits. It will clear his befogged mind of evil superstitions. He will then be able to think for himself and his future He will be able to understand and to take full advantage of the co-operative societies and thus avoid resorting to the money-lenders. I may here sound a note of warning in regard to the measures adopted by the Government for the spread of co-operative methods. The key to success of the co-operative movement lies in creating in the people themselves a desire to render mutual help, to adopt the habit of teamwork, and to appreciate the benefits of joint labour. It should be a movement from below if it is to rest upon secure foundations. In India, from the very nature of the rural problem, it is possibly difficult to stimulate the rural mind and the movement has to originate from above. But in actual administration the true principles of co-operation should not be lost sight of. A Registrar of Co-operative Societies should be a guide and a friend of the cultivators and not a haughty bureaucrat installed in a lofty position, isolated and out of touch with the feelings of the villagers. I feel that considerable improvement could be

**Mass Education (cf. pp. 12, 35, 48, 101, 146, 275, 276.)**

made in the present administration of this department.

### Agricultural Education

Free education of the proper kind once brought to the home of every ryot will, I venture to say, solve most of the economic difficulties of our masses. What actually happens may be illustrated by a reference to any of our village schools to-day. Sons of a few prosperous cultivators are sent for schooling; their education consists of an unintelligent cram of subjects which have no visual meaning in their limited sphere of living. The result is that the young son acquires a distaste for hard manual work and looks longingly towards the city where he can, according to his own understanding, obtain lucrative employment as a clerk and so join the 'Bhadralog Class.' The result is that the rural areas are deserted by the more promising and more capable of the younger generation. This is done in ignorance of the deterioration they are bringing upon their ancestral occupation; they are equally ignorant of the adverse conditions of living in the city, which become more and more acute by continued immigrations. The first lesson we should learn from such a state of affairs is that rural educational areas should specialise in imparting agricultural education alone. I have great regard for literary and cultural education, without which a country cannot attain to the highest pinnacle of civilisation either politically or socially. A

**Education of the right kind to be brought to the home of every ryot** (cf. pp. 129, 201.)

**Peasants' sons to be taught the craft of their fathers** (cf. pp. 29, 130, 142, 227.)

good higher education is, therefore, imperative for a nation. But it must be remembered that the peculiar condition of the masses needs a different treatment. What we require is a systematic attempt in our villages to teach the peasants' sons the craft of their fathers in the light of modern scientific advances. A village school curriculum should also include elementary lessons in chemistry, botany, and physiology, with practical training in carpentry, smithy and manuring. The boys should also be taught general principles of soil treatment, irrigation, the care of live stock, the careful selection of seeds, and the benefits of crop-rotation. Such knowledge and training in the schools should be supplemented by a short course of demonstrations on model farms attached to a group of village schools. During vacations the boys will go back to their homes with their minds full of agricultural "talk" and exert a cumulative, beneficient influence on the actual practice of agriculture in the villages. It will be admitted that the agricultural possibilities in India are boundless. What we need is to create in the people an enthusiasm for the improvement of cultivation and science of agriculture. The great treasure of India lies on the surface, in our uncultivated and in our under-cultivated land. By a network of useful agricultural shhools we may impart to the young sons of the peasant mental alertness and enthusiasm for improvement of agricultural conditions. Education, after all, should prepare boys generally

Virgorous agricultural policy. (cf. pp. 86, 197.)

for a more useful and progressive career than what their parents had. The primary object of education is to fit boys for usefulness in their future stations by preparing them for the battle of life. It can really be useful for future careers and will attract the masses when it has a direct and evident contact with the surrounding activities. The solution of the agricultural problem of India lies, therefore, in free and universal agricultural education of the right type. It may be a long method but I consider that it is the only practical method if we wish to ameliorate the present deplorable conditions.

Object of Education (Cf. pp. 23, 35).

## Problem of Middle Classes

The problem of the middle classes is in a way more difficult, as the openings in life for them are at present limited. The line of advancement for them is the opening up of their occupations. In this connection the proper relief is a drastic change in the system of education at present provided for in the cities. Mere literary or the so-called liberal education is of no use to the majority of people in so far as training for a particular vocation is concerned. What is required is technical education, or, to be more exact, vocational training. The aim should be to teach to work conscientiously and to love work, and education should prepare boys for the future task. With the inception and growth of various industries in the country a large number of skilled workers will be required and it

(Cf. pp. 43-48.)

is the middle classes which can provide this labour. It is a welcome and healthy sign that our educational authorities are directing their attention to improve and reecast the syllabus of the primary schools in a way so as to prepare the ground for the introduction of boys to vocational training after they have mastered the rudiments of reading writing and arithmetic. It is pleasing to note in this connection that the Government of Bengal has, in a reeent letter addressed to the Associated Chambers of Commerce, declared its intention to introduce in certain selected primary schools a finishing course in technical or vocational training on the lines advocated by Mr. Biss in his well-known Report on Primary Education (1921). It is proposed to add a two years' course at the end of the Upper Primary School stage and training would be given for those occupations, for which there is a scope and demand in the locality. The active co-operation of local bodies is invited and I hope it will be forthcoming in good measure.

(Cf pp. 35, 146.)

I admit there are vast difficulties and complications as soon as we begin to look into the details of such a scheme of education for a particular area. Training in a particular profession will be fruitless unless there is scope for the utilisation of trained men. It seems to be necessary, therefore, that other spheres of work than mere clerkships should be opened to the sons of our middle classes. It might also be said with justice tbat the absence of trained technical skill is an impediment in the way

of industrial progress. The problem is, therefore, two-sided :—supply of skilled men is necessary for industrial development, at the same time industries should offer more opportunities for the utilisation of such a supply as is forthcoming. Practical administrators and educationists recognise that with a gradual alignment of the educational policy in the proper direction much can be achieved. What is needed, in my opinion, is a recognition of the present facts about the middle classes : their narrow outlook, their aversion to manual labour their systems of caste regulations and superstitions, their low powers of resistance, etc. The wise policy is to bring enlightenment to their limited visions and, at the same time, stimulate their ambition to grow out of their environments. Opportunities and facilities for entrance into other careers than mere clerkships are, therefore, urgently needed.

Remedies (Cf. pp. 127-31.)

The extreme poverty and ignorance of the people of India has more or less forced very large duties on the State (i.e. the Government of the country). The general trend of history and the need of the times have forced the Central and Provincial Governments to approve the principle of State help to industries. The State must harmonise and direct all the economic energies of the people. Personally I welcome the increasing interest and sympathy which the Government is showing in regenerating Indian economic conditions. H. E. the Viceroy in a notable survey of Indian politics made in his

speech on the 20th August 1925, after his return from England, foreshadowed a more vigorous agricultural policy. He laid stress on the present disjointed activities and declared it to be the determined policy of his Government that agriculture should receive more concentrated and centralised attention. This is all to the good and I doubt not that the Provincial Governments will co-operate heartily in a scheme for co-ordinating agricultural progress. A sympathetic ruler can also wisely initiate many industries with benefit to the entire people. The State departments are the repositories of miscellaneous information and it rests with the able officers of the State to sift this information, make known the results of their careful investigations, and show that industrial risks may reasonably be undertaken.

(Cf. pp. 51, 102, 197.)

## Agricultural Research.

Gentlemen, such are the conditions in India to-day and if you accept this sketch as accurate in its broad outlines, you will naturally ask whether adequate measures have been taken to bring about a general rise in the standard of living of the cultivating classes. The problems I have raised have engaged the attention of Government throughout the years of the twentieth century. Departments of Co-operative Credit, of Agriculture, and of Industries have been established and are actively engaged in co-operation with the Education Department in seeking solutions to the many problems which must

Defects remediable (cf. pp 127, *et seq.*)

arise in dealing with so vast a business as the progressive development of nearly 300 million people. Obviously it is utterly beyond the limits of this address to review even in the most cursory way the work that has been done in this direction by many able men in the last 25 years. India is undoubtedly tending to become industrialised, the yield of its soil is increasing, great additions have been made to its wealth, and its status in the comity of nations has risen in a very remarkable degree. All this may be conceded and it may yet be that the condition of the people of India has not made satisfactory progress and that for all practical purposes, nearly 70 years after the administration of the country was directly assumed by the British Government the main achievement that clearly stands out is an addition of about 100 millions to the number of the inhabitants. What this connotes I need not now discuss. What we want in the future is an improvement in the quality and not an increase in the quantity. The distinctive feature of modern civilization all over the world, as compared with the ancient forms which have passed away except in the East, is the large amount of leisure enjoyed by all classes consequent upon the universal employment of labour-saving machinery in all departments of material activity. Although, no doubt, the cultivator in India speaking generally remains idle for months at a stretch, this is so for want of an alternative occupation; and conditions are rapidly changing in this

Industrialisation of India (cf. p. 14.)

Idleness of the cultivator (Cf. pp. 150-51.)

direction also. Here we see that in this direction India has made comparatively little progress and here we have clearly indicated a field in which it is evident that action should be taken. We all know that the country is called upon to support enormous numbers of totally useless or at best very inferor cattle, that the inferior husbandry is partly due to the necessity of growing food stuff for a disproportionate number of cattle compared to the area of land cultivated. Equally we are aware that the tools and appliances of the ryots whilst simple, ingenious and adapted to the needs of a primitive community, are from a modern point of view comparatively inefficient. It is difficult to remedy matters because of the poverty of the people and the smallness of their holdings. This is the opportunity for the co-operator. In every province of India useful innovations have been introduced on what may be termed an experimental scale but it yet remains to be determined whether the success is due to transient causes, such as temporarily favourable conditions or the personality of the individuals responsible for the new ideas. Special mention should certainly be made of the scientific results obtained in the Agricultural Research Institutes and attention should now be given to devising suitable means, whereby they may be brought to the knowledge of the cultivators, to induce these men to try them under the normal conditions of rural life. Here is a call for administrative skill of the highest

**Inferior cattle,** **(cf. p. 142, 203.)**

**Primitive appliances.**

**Benefits of Agricultural Research to be made widely known** **(cf. pp. 35, 201.)**

order as the goal to be attained is the winning of the confidence of millions of practical men, conservative by instinct, who, from past experience, have a rooted distrust of innovations brought to their notice by outsiders whom they rightly consider imperfectly acquainted with their local and domestic environment.

## Address of H. E. the Governor

### Industrial Development Ahead

Referring to the address of Sir R. N. Mookerjee, H. E. Lord Lytton who was present at the annual meeting of the Asiatic Society, said :—

Sir Rajendra has chosen a subject of vital interest to the well-being of his country and he has treated it in a manner which well sustains his reputation for sound practical commonsense.

**Appreciation of sound practical common sense of Sir Rajendra.**

Coming from one who has had such unique opportunities of studying the question, his words must command the deep attention of all who will read them. They will require detailed study and careful thought. In general I find myself in complete agreement with his presentation of the problem and with his suggestions for its solution. His remarks about the traditions and cultural refinement of the peasant and of the general outlook of this class which so greatly predominates the population of Bengal—quite rightly concentrates our attention on the human aspect of the problem which is often apt to be overlooked and

his analysis of the causes of the present state of affairs leads one naturally to the solutions which he has to offer.

## Industrial Development

That we are on the threshold of a great industrial development in India there can be no doubt. India is being driven in that direction both by demands from without and by economic pressure from within and it behoves those who, like Sir Rajendra, foresee what is coming to make wise provision in advance. The countries of the West that have become industrialised are for the most part examples to be avoided and India will lose far more than she can gain if in the pursuit of material wealth she fails to preserve her native characteristic culture and the more mystical and unselfish part of the religion of her people—what Sir Rajendra has called their "splendour of spiritual dreams." The translation of the agricultural and village life of the Indian peasant into the industrial life of the English or American artisan would be a deterioration, not a gain. What is needed is the elevation and training of a peasantry whose primay business will always be the cultivation of the land which he occupies and loves rather than the depopulation of rural areas by imigration into congested towns. If this end is kept in view there are many routes by which it can be approached. The first is to eradicate the epidemic disease which saps the

**industrialism *versus* simple agricultural life. (cf. pp. 27, 28, 149-51.)**

**Elevation and training of Indian peasantry (cf. pp. 35, 48, 201.)**

strength and energy of the cultivator, the second is to improve the yield of the soil which he cultivates by the substitution of scientific for primitive methods of cultivation, the third is to train his intellect so that he may reap the most profit from his labour and the most enjoyment from his leisure, the fourth is to save him from dependence on the money-lender by teaching him the principles of co-operation, the fifth is to introduce village industries by which he may supplement his income from the soil.

Emergent needs (cf pp. 38, 276.)

Sir Rajendranath has rightly pointed out that all those avenues of progress must be fully utilised if the life of the Indian peasant is to be made less precarious and new source of wealth brought within his reach. Departments of Government exist for all those purposes—they are all subject to popular control and the only thing required is for them to be utilised by men of vision, men of energy, men of unselfish aims. The machinery is there but it is not yet fully used.

Popular control of nation-building departments to be fully utilised.

No political party in Bengal has yet come forward with the object of utilising this machinery of Government for the benefit of the rural population. The fact is, as Sir Rajendranath has pointed out, the *bhadralog* is engaged in too serious a struggle for his own existence to be able to devote his attention to the needs of others, and the employment of this class is at the moment the more pressing problem.

### Two Conditions of Society

There are two conditions of society in which the needs of the poorest are attended to. The first is when the rich are sufficiently numerous and sufficiently benevolent to attend to them out of charity and the second is when the poorest are just rich enough to pay others to attend to them as a matter of business. India is at present passing from the first to the second stage. Such a transition stage is necessarily accompanied by much unrest, much distress, much strife and controversy but these must be borne like the birth pains that accompany the coming of new life. They should not deter us from perseverance towards the better future which they foretold. The spread of education will lead to ever increasing demands from the people whose standard of comfort is raised thereby. The development of industry will produce new wealth with which those demands may be met. The extension of the franchise will lead to more attention to the needs of the new voters and so in India as everywhere else in the world economics will produce problems and politics must solve them.

**Transition stage in India.**

**Comming of new life through distress and strife**

**Statemanship to solve economic problems.**